February 23, 1956

The IRON AGE

The National Metalworking Weekly

Has Job Specialization Gone Too Far? P. 50

Will The Nickel Shortage Ever Ease? P. 47

Detroit: Can Antitrusters Build A Case? P. 64

Digest of the Week P – 2

Chromel-Alumel

THERMOCOUPLE ALLOYS

- **FOR ACCURACY!** Thermocouples made of Chromel-Alumel are unconditionally guaranteed to register true temperature-e.m.f. values within extremely close specified limits . . . ±4°F. from 0° to 530° F.; ±¾% at operating temperatures from 531° to 2300°F.

- **FOR DURABILITY!** Both Chromel and Alumel are highly resistant to oxidation, sensitive to temperature fluctuations. And they maintain their fine accuracy over a wider range of temperatures for far longer periods of time than any other base metal thermocouple materials known.

- **FOR ECONOMY!** In spite of their finer degree of accuracy, their higher temperature range and longer useful life, Chromel-Alumel thermocouple wire costs the user no more than ordinary base metal materials . . . and in many cases, they actually cost less!

Chromel-Alumel thermocouple alloys are produced exclusively by

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Ask for them by name!

Your instrument manufacturer or pyrometer service company can supply your immediate requirements . . . so specify them by name. "Chromel-Alumel" thermocouples . . . trade names you can trust!

Three Forgings That Support the Globe

In Greek mythology, Atlas was charged with the job of holding up the heavens, but right here in our own day and age is a "world" supported by forgings. It is a huge and wondrous globe that stands on the campus of Babson Institute of Business Administration, Wellesley, Mass. Its size may be judged by the people standing beneath it in the picture.

The vividly colorful globe is built to a scale of 1 inch to 24 miles. It can revolve to simulate the daily rotation of the earth on its axis. It also moves around a circular track to demonstrate the earth's orbit.

Holding the globe at its proper "tilt" is a six-ton assembly consisting of shaft, socket, and lower bearing support. All these components are forgings made and finish-machined by Bethlehem. The mounting and carriage are also products of Bethlehem shops.

Tonnagewise, the forgings in this exhibit are small. But as we've said so often, our shops welcome the lightweight jobs, and give them the same careful handling as the heavy-tonnage items. We have produced some of the biggest forgings on earth, and some of the smallest. No matter what size you may need, or what type, we will always be glad to take care of your requirements.

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BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM STEEL

DIGEST OF THE WEEK IN METALWORKING

February 23, 1956—Vol. 177, No. 8

The IRON AGE

Digest of the Week in Metalworking

Starred items are digested at right.

EDITORIAL

Is Red Trade Suicidal? 7

NEWS OF INDUSTRY

*Raw Materials: Is Nickel Shortage Permanent? 47
*Marketing: Powder Tool Industry Looks Good.. 49
*Special Report: Are Jobs Too Specialized? 50
*Management: Look for Strong Labor Drive.... 53
*Labor: Westinghouse Strike Hits Customers... 54
*Expansion: New York Seeks Steel Mill 56
Defense: How Russia Gets U.S. Tools 58

NEWS ANALYSIS

Newsfront 45
Report to Management 61
*Automotive Assembly Line 64
*This Week in Washington 69
*West Coast Report 73
Machine Tool High Spots 75

TECHNICAL ARTICLES

Transfer Machine Makes Crankshafts Straight.. 87
Automatic Line Stamps, Welds Housings Faster 90
Fire System Minimizes Paint Shop Risks 94
New Carburizing Steels for Critical Gearing .. 96
Huge Saw Cuts Into Intricate Contours 101
Why Not Blast Clean Large Equipment? 102
Technical Briefs 112

MARKETS & PRICES

*The Iron Age Summary—Steel Outlook 129
Steel Product Markets 130
Comparison of Prices 131
Iron and Steel Scrap Markets 132
*Nonferrous Markets 136
Steel Prices 139

REGULAR DEPARTMENTS

Free Literature 104
New Equipment 120

INDEX OF ADVERTISERS 155

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NEWS DEVELOPMENTS

HAS JOB SPECIALIZATION GONE TOO FAR? P. 50

IBM and Detroit Edison are doing some interesting things with a concept known as job enlargement. Idea is to make workers happier and more productive by giving them greater work variety. Study of the two companies shows both benefits, limits.

MANAGEMENT LOOKS AT LABOR'S OBJECTIVES P. 53

AMA learns that Labor is set for aggressive drives in 1956. Group warned that engineers are susceptible to union courtship.

WESTINGHOUSE STRIKE HURTS CUSTOMERS P. 54

Serious problems have been avoided, but users of heavy equipment will feel pinch later. Shipment schedules for strike-bound plants will be extended by length of strike. Customers continue to show confidence, continue to place orders despite strike.

CAN NEW YORK LURE NEW STEEL MILL? P. 56

State is making strong bid to get a new integrated mill. Seaway gives Lake Ontario location lift, but Hudson Valley also has advantages. State's large metalworking market plus availability of raw materials are big points in attracting new capacity.

CAN TRUST BUSTERS BUILD AN AUTO CASE? P. 64

Justice Dept. threatens new suit against auto industry. But there seems to be scant chance of building strong case. Auto history is filled with failures of companies who lacked capital. Size still helps.

MOTIONS of modern industrial worker are shown in this multiple-exposure Dupont photo. Many say job specialization has gone too far, made work dull and uninteresting. They call for job enlargement. See story p. 50.

AIRCRAFT WORKERS BUCK FOR 35-HR WEEK P. 73

West Coast aircraft workers demand 35-hour week in new negotiations. International Assn. of Machinists includes short week in list of demands. UAW, working with IAM in solid front, is expected to go for similar package at other plants. Negotiations will bear close watching.

FEATURE ARTICLES

TRANSFER MACHINE MAKES CRANKSHAFTS STRAIGHT P. 87

"Rough machining" doesn't necessarily mean inaccurate work. Example: a four-station automatic transfer unit at Chevrolet does very accurate initial machining on crankshaft forgings, thus helps eliminate costly straightening operations. It also saves considerable handling of parts.

LINE STAMPS, WELDS HOUSINGS FASTER P. 90

Improving a production setup often goes hand-in-hand with a design change. Buick demonstrates this with its new, integrated stamping and welding line. Work flow now is continuous, with production of 120 housings hourly. In the thicker housing design, coil stock in place of earlier-used sheet is practical. Joining housing halves with four simultaneous butt-welds helps boost output.

FIRE SYSTEM MINIMIZES PAINT SHOP RISKS P. 94

Despite fire-fighting advances, fire losses in U. S. continue on a ragged, long-term rise, may nudge annual $1 billion mark within next decade. Industry picks up large piece of this tab. Most plants are vulnerable. Here's how one plant, once-burned, set about hedging against future fire risks with improved equipment.

NEW CARBURIZING STEELS FOR CRITICAL GEARING P. 96

Making use of molybdenum as the chief alloying element, a new series of carburizing steels is proving its superiority on the production line and in automotive gear performance tests. These extra tough alloys combine high case hardness with optimum wear resistance. For heat treating short cuts, they can be quenched directly from carburizing. Retained austenite is not a problem. Control of surface-carbon content is simplified.

WHY NOT BLAST CLEAN LARGE EQUIPMENT? P. 102

Grease, dust, dirt accumulations are tough to remove from large electrical motors, generating equipment. Elbow grease, hand methods are one answer. This plant found blast cleaning with corn-cob grits a better solution.

MARKETS AND PRICES

WILL THE NICKEL SHORTAGE EVER EASE? P. 47

Shortage clouds are clearing but they're not gone yet. 1956 production looks like a record, but so does consumption. Nickel will be just as short this year as last.

POWDER TOOL INDUSTRY IS A HEALTHY BABY P. 49

The 8-year-old powder-actuated tool industry expects this year's sales to hit $8.5 million, a $1.5 million gain over 1955's record $7 million level. Within 5 years, major producers are looking for a $40 million annual business.

RED COPPER TRADE DRAWS PENTAGON FIRE P 69.

Latest figures show Great Britain shipping copper wire to Russia at a rate of $15 million a year. U. S. sends no copper directly to Reds and State Dept. says we shouldn't try to control British trade. But military men point to copper's vital role in defense.

INDUSTRY FACES A TOUGH STEEL MARKET P. 129

Steel consumers are learning that the market is going to be anything but easy in the months ahead. Steel industry itself is struggling to get what it needs for own expansion.

CHILEAN PRESSURE PUSHES COPPER UP P. 136

Late last week Anaconda Copper Co. announced a 3¢ increase in the price of copper to 43¢ per lb. At the same time, Chile revealed that it had requested such an increase.

NEXT WEEK:

ECONOMIST JANEWAY MAKES NEW FORECAST

Uncanny accuracy of Eliot Janeway in calling the turns on inflation, steel, and scrap in recent years has business looking forward to his newest analysis. Next week Mr. Janeway sizes up the overall economy. His forecast is clear, decisive and well-documented by detailed facts.

TUBULAR STRUTS MAKE SHORT WORK OF CONSTRUCTION

A system combining (1) standardized construction, (2) precision formed interchangeable parts and (3) simplified assembly, is achieving some startling results on new construction projects. Roll-formed members are assembled on the job in less than one-third the usual time. Costs are competitive.

I GOT MY RAISE
thanks to "ELL" & "ESS"

Sometimes our design department gets me into trouble.
Like a few months ago when they needed a fastener to do a particularly tough and tricky job. I checked several bolt and nut companies but no soap. Seems that nobody could get me off the spot.
Then I got "Ell" & "Ess" on the line. That's Lamson & Sessions, you know. They not only solved my problem but suggested using a fastener that cost less than we'd expected to pay!
Naturally the boss was plenty happy about it. Happy, did I say? That's putting it mildly! That extra dough on my pay check speaks louder than words. He was downright *enthusiastic!*

The LAMSON & SESSIONS Co.

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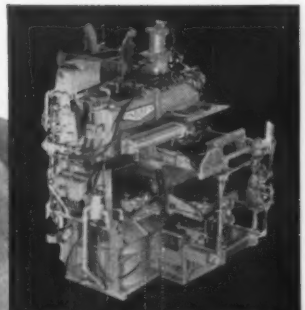
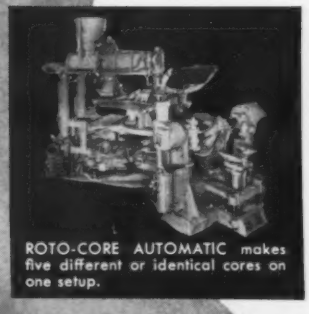
PLANTS AT CLEVELAND AND KENT, OHIO · BIRMINGHAM · CHICAGO

AUTOMATION

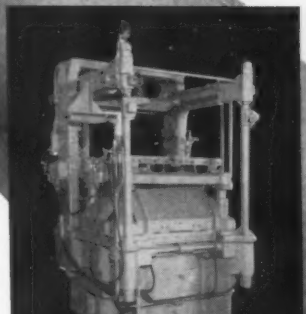
OSBORN'S ANSWER TO LOWER COSTS



MULTIPLE STATION AUTOMATIC MOLDER—Handles molds from loose sand to finished mold delivered on conveyor.



ROTO-CORE AUTOMATIC makes five different or identical cores on one setup.



JOLT SQUEEZE STRIPPER — Automatically handles all operations of turning out molds at high rate of production.

AUTOMATIC equipment—introduced and engineered by Osborn—enables foundries to produce top-quality molds and cores on fast, predetermined, repetitive cycles . . . uniform throughout the entire production run. The heavy-duty design of these precision machines virtually eliminates costly down-time.

An Osborn foundry specialist will show where you can cut casting costs, improve quality. Call or write *The Osborn Manufacturing Company, Dept. FF-39, 5401 Hamilton Avenue, Cleveland 14, Ohio.*

Visit our Exhibit at The Castings Congress, Atlantic City, May 3-9.

OSBORN

CORE BLOWERS MOLDING MACHINES

INDUSTRIAL BRUSHES

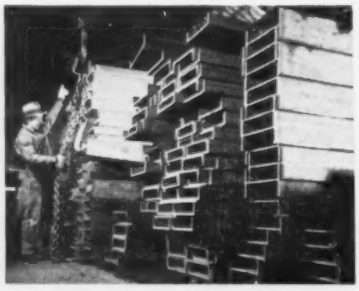
MEMBER FEMA

Leader in automation for the foundry

STEEL BUYERS GUIDE to Ryerson Products and Services

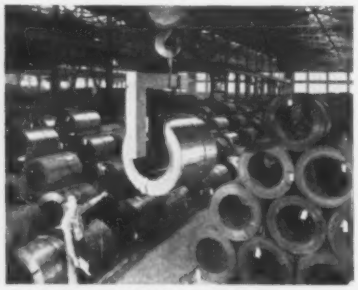
You can draw on your nearby Ryerson plant for an almost endless number of products and services—and the more you concentrate your purchases at one source, the more you save. Ryerson products not pictured here include: Re-bars, expanded metal, grating, plastic pipe, machinery and tools, etc. See your Ryerson catalog for complete list and write for descriptive literature.

BARS—The most complete range of types, shapes and sizes as well as the largest tonnage.

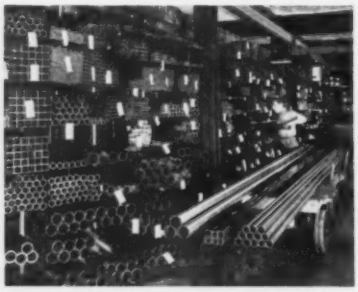


STRUCTURALS — I-beams, H-beams, channels, angles, tees and zees—all to ASTM spec. A-7.

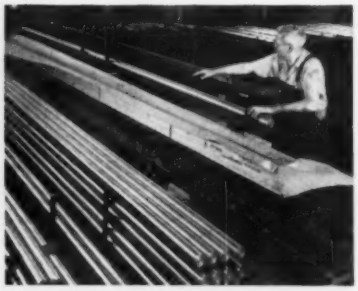
PLATES—14 types including special low carbon plates for forming and welding, leaded E-Z-Cut, etc.



SHEETS & STRIP—More than 20 different types in pattern sizes, cut-to-order sizes, strip coils, etc.

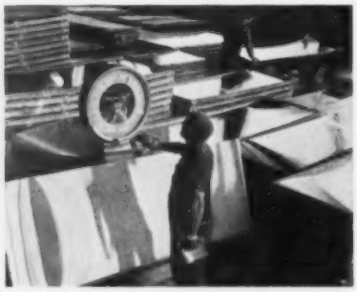


TUBING—Seamless and welded mechanical tubing, fluid power tubing, structural and boiler tubes, etc.

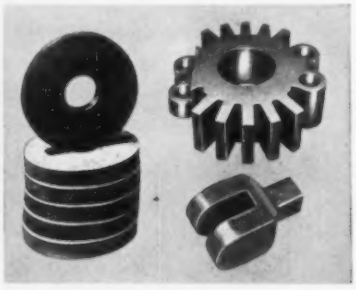


C. F. BARS—Cold finished steel for every use: screw steel, Ledloy, accuracy stock, machinery steel, shafting, etc.

ALLOYS—Every type including leaded alloys for fastest machining, all performance-proved by tests.



STAINLESS—Allegheny stainless in over 2,221 sizes, shapes, types, finishes: sheets, plates, bars, pipe, etc.



FLAME CUTTING—Almost any shape quickly cut from strong rolled steel—one or hundreds all alike.

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Indexed in the Industrial Arts Index and the Engineering Index.

ABP NBP

EDITORIAL

Is Increased Red Trade Suicidal?

◆ THERE ARE DISQUIETING signs of pressure for relaxing trade barriers with Red China. There are signs too that many Americans feel no "harm" can be done by stepping up our trade with the Russians. Major domestic events obscure these recent trends:

The Reds are at war with us. They have been for some time. It isn't a shooting war—yet—but the ultimate goal is the same. They hope to eventually crush us and knock off everyone else. They feel we are stupid enough for them to soft pedal their "inevitability of war" dogma.

No matter what their propaganda says, the Reds are constantly trying to ruin us with our friends the world over. While they are doing this they are building up the biggest heavy industry economy outside of the United States.

There is a lot of fluff being bandied about to the effect that trade breeds peace; that it inhibits war and makes everyone friends. If that applies at all it applies strictly to free people. It doesn't fit the Red pattern.

Increased trade with China, by us or by other nations, can do nothing but build up a future war machine in the Far East. At present, Red China is draining Russia of important materials in order to meet her "plans." Should we relieve this pressure?

Russia wants trade with outsiders if she can get what she wants and what Red China wants. They don't seek ordinary things. They want more machine tools for heavy industries (military), strategic materials, and the latest in electronic and other types of machinery.

Red China has made far more progress than is generally supposed. Despite the industrial sacking of Manchuria by the Russians, the Chinese Reds have gone ahead at a startling rate. Now it is hurting a bit so they want more help. Should we give it?

We are in a grim struggle with Communism. The stake is freedom. If you believe that you can't help but agree that increased trade with the Reds is long term suicide.

Tom Campbell

EDITOR-IN-CHIEF

Successful Stylists

• Trim lines effectively accented with stainless steel have brought to the modern motor car the equisite beauty once reserved for only the finest limousines.

Today there's no need for the average motorist to pamper his gleaming trim and accessories any more than he does the body enamel, for corrosion fighting stainless steel keeps its new car brilliance years longer, even under the toughest road conditions. Discerning designers and stylists are converting more and more car parts to stainless — and an increasing number of these parts are fashioned from Sharonsteel. Steel buyers who have compared know they can expect a better finish and a more consistent quality — coil after coil — when they specify "Sharon Stainless Steel."

DESIGN ALONG THESE LINES

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dear editor:

letters from readers

Are We Losing Our Guts?

Sir:

The answer to the editorial in your February 9, 1956, issue, "Are We Losing Our Guts?" is "Yes."

We are not only losing them—we lost them a long time ago. I think we lost them when our great industrialists, who were sitting at the bargaining tables with the unions, gave them the closed shop—when they gave them the check-off, because these were easy things to give away—they did not cost much. We lost our guts when we gave the Federal Government the check-off system on the Federal income tax. We lost our guts when business collected for Social Security. We lost our guts when big business collected from employees for all kinds of charitable funds.

That was the time when we lost our guts, and it seems almost impossible to regain them. *F. K. Hellinger, Culpeper, Va.*

Prayers For Ike

Sir:

I am assuming the privilege of congratulating you and encouraging you to further endeavor.

That editorial of yours in the February 2, 1956, issue of IRON AGE is a masterpiece of saying nice things about a great man.

I am sure Mr. Eisenhower will go down in history with a rating of not less than one of our greatest Presidents—I agree with you in your general concept that we should try to help rather than hinder — certainly our prayers should be to keep Mr. Eisenhower alive and if that includes being President too, we shall be most fortunate but, if it doesn't, not all is lost because his influence will be great even if he is not re-elected. *F. A. Knapp, Glenshaw, Pa.*

Stainless $

Sir:

My most sincere congratulations on the article, "How To Get More For Your Metalworking Dollar."

I am sure that this series which you have started will prove to be among the most valuable things ever done by your magazine.

I wonder if it would be possible for you to arrange to have 50 copies of the article on stainless sent to me as I would like to distribute them to the members of the Committee of Stainless Steel Producers and others on my regular mailing list. *R. E. Paret, Committee of Stainless Steel Producers, American Iron and Steel Institute, New York, N. Y.*

Vacuum Metals

Sir:

The feature article entitled "Why Is The Big Money Behind Vacuum Metals," appearing in the January 26th issue of your magazine is very interesting.

We should like to take advantage of your kind offer to supply a copy of a complete bibliography which has been prepared on vacuum melting. *A. D. Meyer, Vice President, Ajax Electrothermic Corp., Trenton, N. J.*

Ionography

Sir:

In the December 22, 1955, issue of the IRON AGE, a reference was made on page 25 to a new method of producing radiographic images by using a process called Ionography. It is claimed that the method is simpler and less expensive.

I would be interested in obtaining further data on the process. *R. A. Petell, Petersburg, N. Y.*

More information may be obtained from the U. S. Naval Ordnance Laboratory T10, White Oak, Silver Spring, Md.—Ed.

I'M A TOUGH BUYER

BUT GARRETT'S GOT IT FOR QUALITY

No sir, you *can't beat Garrett* when it comes to top quality in small parts. Their "statistical quality control system" means every shipment you get is the finest. But quality is only part of what I like about Garrett. They manufacture and stock the world's most complete line of washers and hose clamps. Boy, when you need any kind of a lock washer, flat washer, spring washer or hose clamp you get it fast . . . most everything right out of stock.

When it comes to stampings and assemblies that's where their high-speed automatic equipment stars. Turns out exactly what you want in no time at all.

Sure, I'm a tough buyer. I want the best. I want it fast. I want it priced right. And Garrett is the place for me.

LOCK WASHERS
FLAT WASHERS
HOSE CLAMPS
STAMPINGS

Manufactured by

GEORGE K. GARRETT CO., Inc.
Philadelphia 34, Pa.

Garrett
OF PHILADELPHIA

BAKER "FG"
— a new concept in gas truck construction —
"BALANCED DESIGN"

Here's how the Baker FG gas fork truck—"first in its class"—was conceived:

First: Exact requirements for a specific truck in the FG line were thoroughly analyzed. Then our engineers, working with a top manufacturer of heavy-duty industrial gas engines, chose the power plant specifically to meet these requirements. Even internal parts of the engine were balanced. For example, our specifications call for pistons balanced to ± 2 grams instead of the conventional ± 2 ounces.

Next: Transmission was selected to match the power plant and geared to provide required speeds and acceleration. In conjunction with the largest builder of axles in the country, the drive axle was developed to match power plant and transmission.

Lifting mechanism was selected to meet requirements and to be coordinated with power train and other components. *Mast* was engineered for the maximum safe lift, within the stability ratio of the frame which was designed for exceptionally low center of gravity. The standard Baker wide-angle steer, rubber mounted, trailing axle was modified to match the other elements.

Result: 100% Balanced Design —another Baker "First".

Baker "FG" gas fork trucks are available with 3,000, 4,000, 5,000 and 6,000 pound capacities. Specific bulletins can be obtained by writing The Baker-Raulang Company, 1227 West 80th Street, Cleveland 2, Ohio.

A Subsidiary of Otis Elevator Co.

Baker®
handling equipment

8 REASONS WHY THE BAKER FG FORK TRUCK IS FIRST IN ITS CLASS...

1. LOWER INITIAL COST
Costs considerably less than other trucks in its class.

2. LONGER WARRANTY PERIOD
Baker quality permits full 6 months' warranty.

3. HIGHER LIFT
Mast design allows higher standard lift than ordinary trucks.

4. LOWER MAINTENANCE COSTS
Designed for easier and less frequent servicing.

5. MORE MANEUVERABLE
Short turning radius cuts aisle width, adds floor space.

6. EASIER TO OPERATE
Greater visibility . . . easy-to-work controls.

7. GREATER STABILITY
Lower center of gravity . . . higher "stability factor" ratio.

8. BETTER BRAKING
Full floating, self-equalizing, self-energizing brakes.

5G1

fatigue cracks

by William M. Coffey

Letters

Dear Coffey:

It is with great dismay that I have to come upon you. Your "crack"—"What do you think of the New Cover" is too Fatigue Cracky Man, let me tell you this:

a. As THE Art Director of "your" magazine I would much rather bite off my thumbs than to have the Front Cover worked over by *illustrators*. That's designers—man . . . graphic designers, that is.

b. How about giving the Art Director what the Art Director is. Please spell my name properly, J. A. DEGEN.

(not sincerely yours),
J. A. Degen
THE Art Director
The Iron Age

(Jean, we're real sorry. But don't be too concerned as everybody knows that this is the only inaccurate page in IRON AGE. *And only 24 people read it anyway and they're all our relations.*

Gentlemen:

As a newcomer I consult the periodical-subscription file, it makes me very astonished for the negligence of my predecessor. Because the Iron Age published by your company, had reached its expiration long ago. I contact with our purchase section, even they neglected it.

Intend to keep this most authoritative magazine in metal industries. I negotiate with my directors, but limited by our poor budget we can not make a renewal.

I am too sorry to bring you this message, and with many many thanks for your generosity for the continuing send us the magazine. Now I think it's high time to stop the continuation, otherwise it would bring us the more abashment.

——— Government Arsenal
Formosa, China

(Dear Mr. Yang: Don't you be too concerned, either. All predecessors are negligent and all budgets are poor no matter where you set up shop. Just have to learn to live with these things.)

Puzzlers

We seem to have varying opinions on the odds in Caleb Flerk's card problem (January 26 issue). Ole Jim Mull, The North American Manufacturing Co., swears the odds are 2 to 1; but Sarie and the General Steel Casting Iron Age Puzzle Club swear they are even and so does John Homer, Jr., Norman Chase, Dave Groman and Jack McCallum. Any other opinions?

New Puzzler

"Rusty" Corley sends in another one about Caleb Flerk.

Caleb was flying high over Philly and heading for Flerkville 50 miles away, when Cousin Ezra sent up a carrier pigeon with a message to Caleb not to land, but keep right on going as the Navy was looking for him. This was a pretty smart pigeon; it flew a straight intercepting course with Caleb and delivered the message. After resting for 10 minutes on the plane, the pigeon flew a direct line home. Caleb continued on the same course and altitude at 50 mph, and the pigeon flew at 20 mph. How long did it take the pigeon to make the round trip?

Bonus Puzzler

A house painter has a ladder 12 ft long. He is painting a vertical wall. At the base of the wall is a box with a 3 ft square cross section area. With the ladder touching the edge of the box and its foot resting on the ground, what is the highest point at which the ladder will touch the wall?

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SIMONDS has over 60 years' experience in cutting quality industrial gears. We can supply any type of gear in cast or forged steel, gray iron, bronze, Meehanite, rawhide or bakelite in a full range of sizes adaptable to the material. Also heat-treated, case or flame hardened gears of carbon or alloy steel. Send us your requirements for quotation.

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SIMONDS' facilities can produce any type of custom gear from your blanks if you prefer. Same quality . . . same prompt service.

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Also stock carrying distributors of Ramsey Silent Chain Drives and Couplings; and industrial V-belts.

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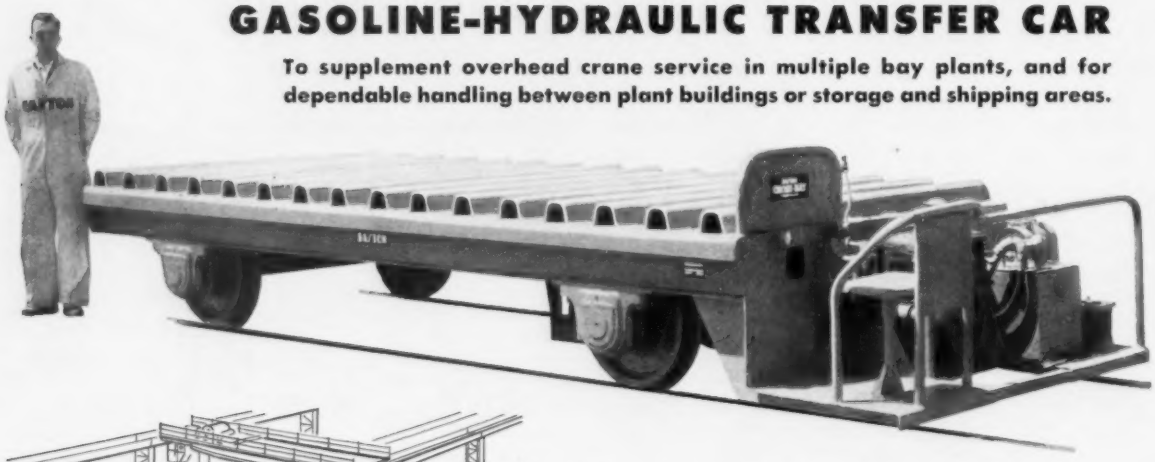
THE SIMONDS GEAR & MFG. CO.

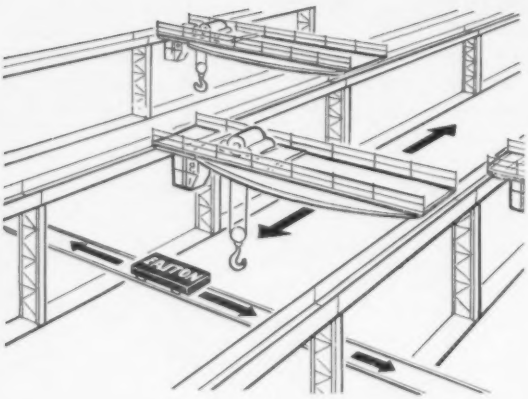
LIBERTY at 25TH PITTSBURGH 22, PA.

NEW CROSS-BAY®

GASOLINE-HYDRAULIC TRANSFER CAR

To supplement overhead crane service in multiple bay plants, and for dependable handling between plant buildings or storage and shipping areas.

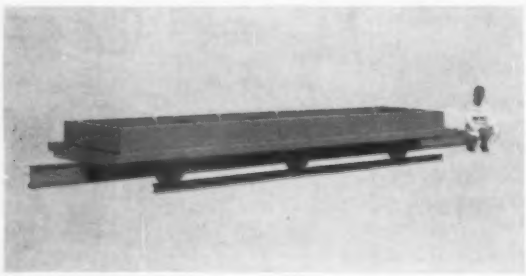




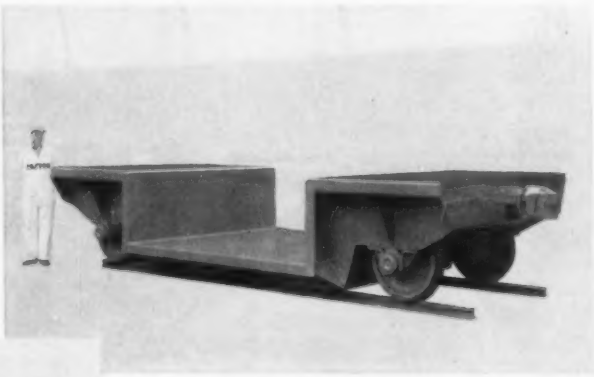
EASTON CROSS-BAY CARS are custom-built to meet speed and capacity requirements. Special superstructures can be designed for specialized or mechanized handling. The gasoline-hydraulic Cross-Bay Car illustrated above was built for steel warehouse work. It provides a capacity of 25 tons plus 50% for impact loading, and a two-way speed of 50 feet per minute.

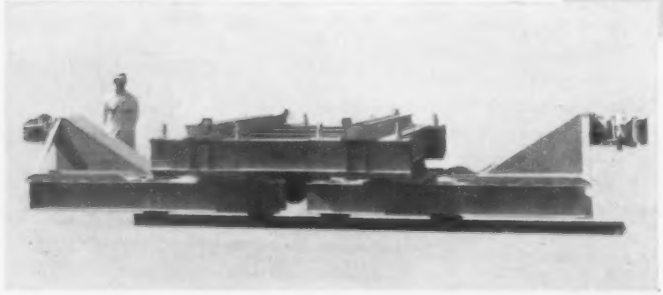
In addition to the gasoline-hydraulic car shown above Easton Cross-Bay Cars may be powered by electric motor, electro-fluid drive, gasoline-electric drive or storage battery. Capacities from 5 to 500 tons. Controls may be manual, electric (by push-button on the car or remote station) or electronic.

SEE EASTON FIRST FOR CUSTOM-BUILT CARS FOR INDUSTRY



Annealing Furnace Car Equipped with Rack Beam ▲





▲ Split-level Platform Car—Capacity 50 tons

◀ Double-truck Transformer Transfer Car —Capacity 150 tons

A-1049

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dates to remember

MARCH

INSTRUMENT SOCIETY OF AMERICA —Sixth annual conference and exhibit, March 5-7, Hotel Webster Hall, Pittsburgh. Society headquarters, 845 Ridge Ave., Pittsburgh

NATIONAL ASSN. OF WASTE MATERIAL DEALERS, INC.—43rd annual convention, March 11-13, Waldorf-Astoria Hotel, New York. Society headquarters, 271 Madison Ave, New York 16.

INTERNATIONAL ACETYLENE ASSN. —56th annual convention, March 12-14, Statler Hotel, Los Angeles. Society headquarters, 30 East 42nd St., New York.

EXPOSITIONS

ASTE—Industrial exposition, March 19-23, Chicago.

MATERIALS HANDLING SHOW, June 5-8, Cleveland.

ASSN. OF IRON & STEEL ENGINEERS, Sept. 25-28, Cleveland.

METAL SHOW—Oct. 8-12, Cleveland.

NATIONAL ASSN. OF CORROSION ENGINEERS — National conference and exhibition, March 12-16, Hotel Statler, N. Y. Society headquarters, 155 E. 44th St., N. Y.

PRESSED METAL INSTITUTE—Annual spring technical meeting, March 14-16, Hotel Carter, Cleveland. Society headquarters, 3673 Lee Rd., Cleveland.

STEEL FOUNDERS' SOCIETY OF AMERICA — Annual meeting, March 19-20, Drake Hotel, Chicago. Society headquarters, 606 Terminal Tower, Cleveland.

FARM EQUIPMENT INSTITUTE—13th industry-research conference, March 28-29, Cornell University, Ithaca, N. Y. Society headquarters, 608 S. Dearborn St., Chicago.

APRIL

MATERIAL HANDLING INSTITUTE—Spring meeting, April 3, Edgewater Beach Hotel, Chicago. Society headquarters, 813 Clark Bldg., Pittsburgh.

AMERICAN INSTITUTE OF STEEL CONSTRUCTION, INC.—Annual spring engineering conference, April 4-6, Lehigh University, Bethlehem, Pa. Society headquarters, 101 Park Ave., New York.

AMERICAN SOCIETY OF LUBRICATION ENGINEERS — Annual meeting and lubrication exhibit, April 4-6, William Penn Hotel, Pittsburgh. Society headquarters, 84 E. Randolph St., Chicago.

METAL POWDER ASSN. — 12th annual meeting, April 10-12, Cleveland Hotel, Cleveland. Society headquarters, 420 Lexington Ave., New York.

in fact...forged to be ahead

Forging has long been recognized as a superior method for producing tool steel billets from ingots. This more thorough working is one of the steps that makes possible tool steels which are capable of maximum toughness and performance. *It helps you produce your finest tool steel products.*

Vulcan forges *all* of its tool steel ingots—carbon to high speed steels—although forging requires greater skill and care. Why not take advantage of this assurance—Vulcan Tool Steels cost no more.

find out more now

Vulcan Tool Steels are available in all types, shapes and sizes. See your Vulcan representative, or write for Vulcan Tool Steel Data.

Vulcan Crucible Steel Co. Division

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H. K. PORTER COMPANY, INC.
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Offices in Pittsburgh, New York, Cambridge, Baltimore, Birmingham, Detroit, Lansing, Chicago, Milwaukee, St. Louis.

E.F.* makes BAY STATE

*"EF" is the latest "Wheels of Progress" development. Send for your copy of this illustrated descriptive booklet.

Grinding Wheels BETTER!

"Electronic Formulation" is the first use of an electronic "brain" for flawless calculation of grinding wheel ingredients. Its precision is unmatched in the industry.

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★ **SPECIFICATION . . .** When your grinding requirements are analyzed, BAY STATE abrasive engineers have the industry's sharpest specifying tool. "EF's" equal-step, straight-line progression of grade and structure makes this new degree of accuracy practical.

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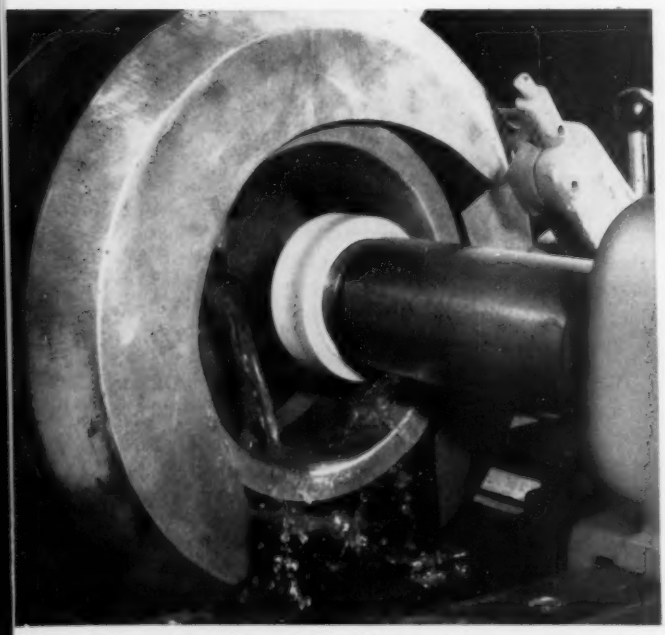
★ **DUPLICATION . . . . .** When you reorder BAY STATE wheels, the perfect "memory" of electronically punched cards assures absolute accuracy in duplicating . . . and faster order processing too.



"EF" brings new dependability and accuracy to all precision grinding, such as this critical internal operation.

For full engineering benefits from this latest "Wheels of Progress" development, call in your local BAY STATE DISTRIBUTOR.

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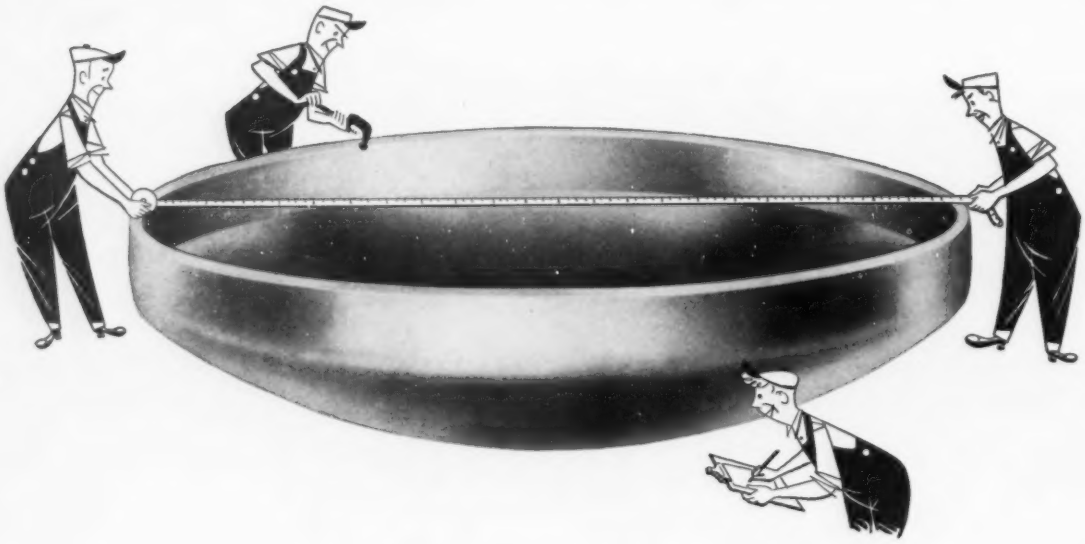
BAY STATE ®
WHEELS of PROGRESS

CLAYMONT HEADS



made to satisfy the most exacting specifications

Claymont Flanged and Dished Heads can be supplied to meet the specifications of the most exacting fabricator or user. That's because Claymont produces heads in a wide variety of sizes . . . from carbon, alloy, stainless-clad and Lectro-Clad Nickel Plated Steel as well as from non-ferrous metal supplied by our customers . . . and in two classifications:

CLAYMONT SPUN FLANGED AND DISHED HEADS in diameters up to 19 feet. They have long been the favorites of fabricators.

CLAYMONT PRESSED FLANGED AND DISHED HEADS are available in diameters up to 10 feet. Produced on modern equipment, including Claymont's new 3000-ton press, these heads are finding wide acceptance throughout the fabricating industry.

What's more, many of the more popular sizes and types of Claymont Flanged and Dished Heads are stocked throughout the nation in convenient CF&I warehouses. This assures prompt delivery of your head requirements and helps hold your inventory to a minimum.

We'll be happy to tell you how you can use Claymont Flanged and Dished Heads to best advantage in your own operations. There's no obligation on your part, of course, so why not contact us today? Write the nearest sales office or direct to Wickwire Spencer Steel Division, The Colorado Fuel and Iron Corporation, P.O. Box 1951, Wilmington, Delaware.

CF&I *Claymont Steel Products*

3714

Products of Wickwire Spencer Steel Division • The Colorado Fuel and Iron Corporation

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OTHER CLAYMONT PRODUCTS

Carbon and Alloy Steel Plates • Manhole Fittings and Covers • Stainless-Clad Plates • Large Diameter Welded Steel Pipe
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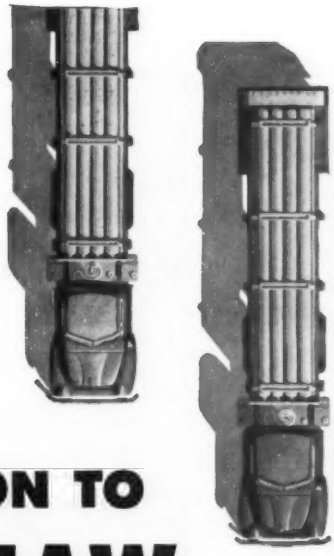

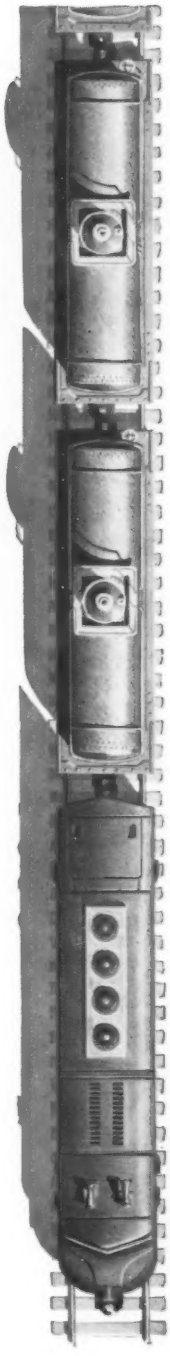

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BORON TRIFLUORIDE
HYDROFLUORIC ACID
anhydrous . . . aqueous

Here are many more production-controlled, high-quality fluorides:

- Ammonium Bifluoride
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- Boron Trifluoride
- Boron Trifluoride Complexes
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- Hydrofluoric Acid Anhydrous
- Hydrofluoric Acid Aqueous
- Hydrofluosilicic Acid
- Lead Fluoborate
- Metallic Fluoborates
- Potassium Bifluoride
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Harshaw's 40-page Book on Hydrofluoric Acid Anhydrous. It provides helpful data.

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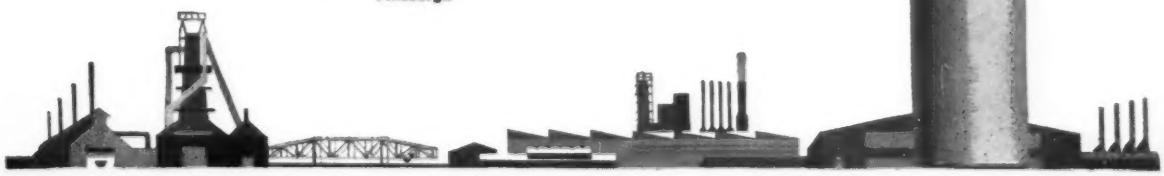

Revere's GREAT NEW PRODUCT...

Tube-In-

It's a single piece of metal . . .

COPPER • BRASS
1801
REVERE
ALUMINUM

Patents Applied for

Available in Copper, Brass,
other Copper Alloys, and Aluminum

Strip

Here, for the first time, is a combination of tube and strip that is made from a single piece of metal! No joints! The product of intensive development by Revere's Research and Development Department, which sought and found a brand new way to give American industry tube plus strip that is more economical to buy, more economical to work, stronger and more efficient in performing 1,001 tasks.

Remember Revere Tube-In-Strip is solid, not two strips welded, brazed, or bonded together.

What does this mean to you? You buy strip, fabricate it as you wish, stamping, bending or forming it, and then as a final operation inflation expands the integral channels into tubes. Expanding in the open, the tubes are round; by expanding into dies, the tubes can be made rectangular, fluted, half-round, hexagonal, etc.

METALS: Copper, Brass, other Copper Alloys, Aluminum, many others.

ECONOMY: You save in first cost, and in fabrication. New and improved designs are made possible. The web between the tubes conducts heat faster. The vastly increased structural strength means you can use lighter gauges, saving in weight and in price.

The applications of this radically new, different and superior Revere Product are unlimited. We most proudly present Revere Tube-In-Strip to the designers and manufacturers of American Industry. The Revere Technical Advisory Service and the Research and Development Department will gladly collaborate with you in taking full advantage of this marvelous new material.

SOME OBVIOUS USES

REFRIGERATION
- Condensers
- Evaporators
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- Car and Truck Radiators
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AIRCRAFT
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- Gas and Fluid Heat Exchangers

AUTOMATION
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- Structural
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MANY, MANY OTHER APPLICATIONS IN EVERY INDUSTRY

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COPPER AND BRASS INCORPORATED

Founded by Paul Revere in 1801

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Mills: Baltimore, Md.; Brooklyn, N. Y.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Newport, Ark.; Rome, N. Y.
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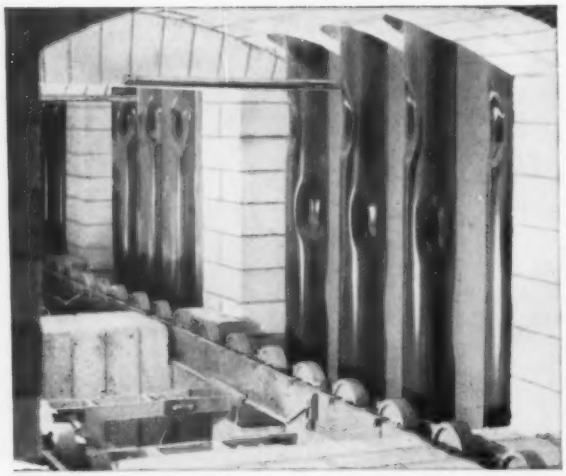
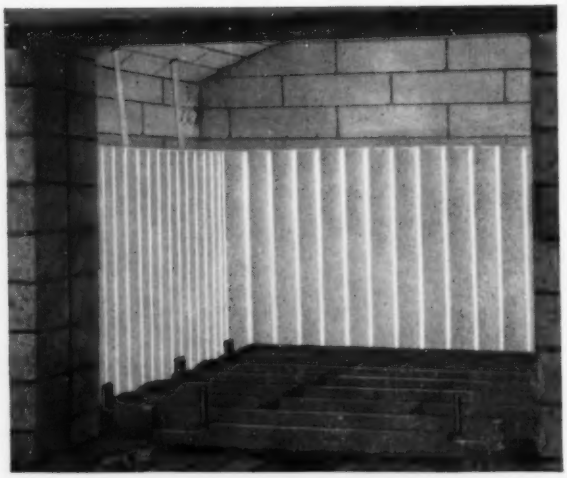
Whatever your source of heat...

LINDBERG HEAT TREATING FURNACES OFFER THESE EXCLUSIVE ADVANTAGES





. . . IN THE GAS-FIRED FURNACE
NEW LINDBERG VERTICAL RADIANT TUBE

Because of its revolutionary design, this tube provides a new level of gas-fired furnace performance. The secret lies in the new Lindberg tube's "dimples." The tube carries a central stream of mixed air-and-gas surrounded by a cylindrical stream of air alone. Combustion occurs in the area between these two streams. The "dimples" create eddies accelerating combustion and maintaining even temperatures along the entire tube.

This Lindberg tube will operate at maximum efficiency for a longer period of time. The special protective coating gives greatest possible resistance to carbon penetration. Vertical position eliminates soot deposit and resultant temperature increases at points of sooting.

Tubes are 59 inches long, weigh only 29 pounds, changeable in a few minutes. No costly furnace shutdowns nor high labor and material cost for tube changes.

. . . IN THE ELECTRIC FURNACE
NEW LINDBERG CORRTHERM ELEMENT

CORRTHERM, Lindberg's radically advanced new electric heating element offers advantages never before available for heat treating furnaces. With this new element carburizing and carbonitriding with electricity becomes practical, efficient and economical. Ideal, too, in other types of Lindberg electric furnaces.

The outstanding feature of the CORRTHERM element is the extremely low voltage at which it operates. Consequently, leakage through carbon saturation and shock or short hazards are eliminated. Elements also act as baffles to direct circulation of convection streams.

CORRTHERM elements are practically indestructible. Work load or operator's charging tool can't hurt them. Watts density is at all time low. Easily installed or replaced, too, as element merely hangs in furnace and no complicated mountings are required.

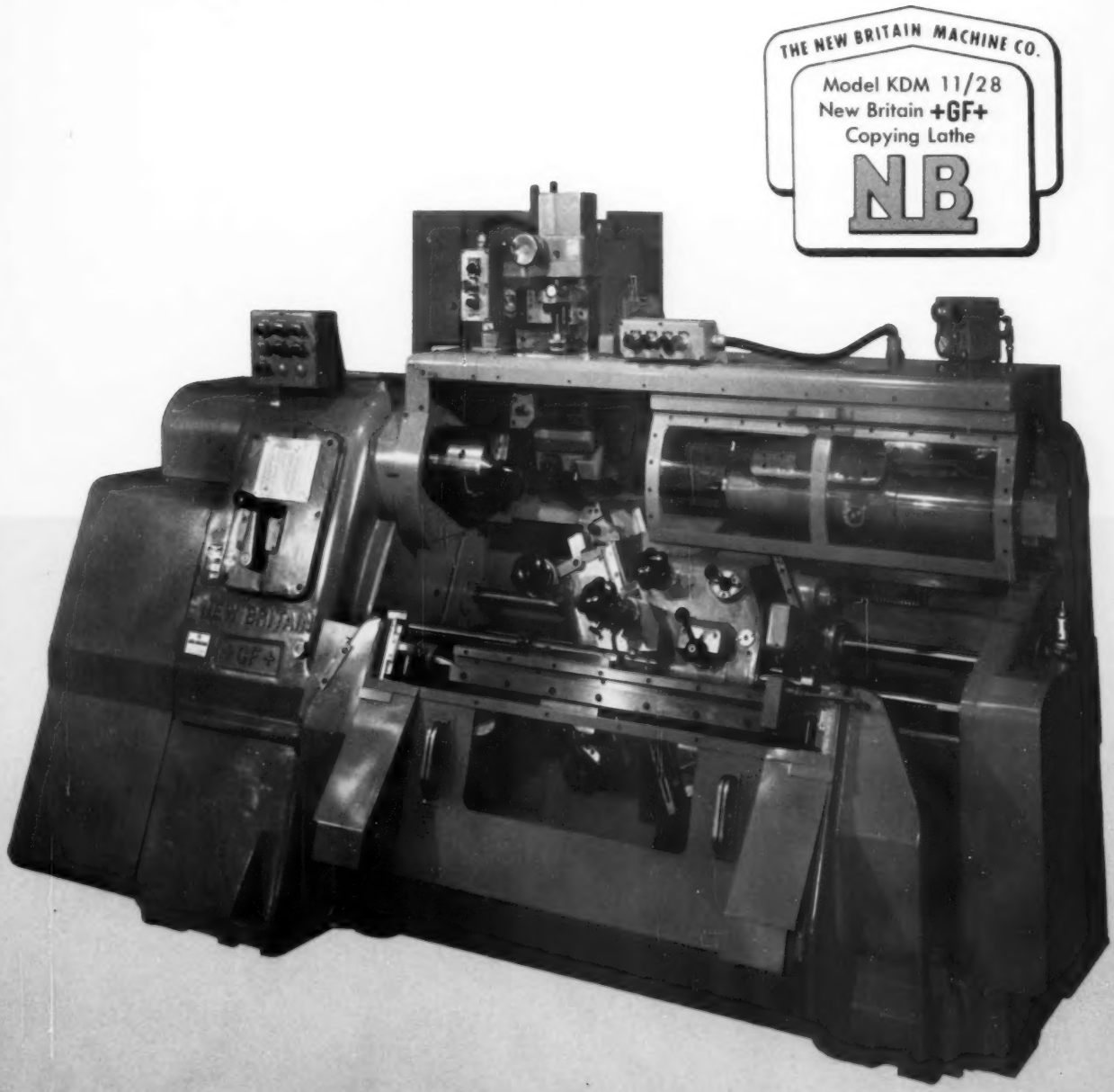
Lindberg Field representatives in 21 cities are ready to show you how Lindberg furnaces with these revolutionary new elements can improve your heat treating process. You'll find your Lindberg representative's name in the classified section of the phone book or write us direct.

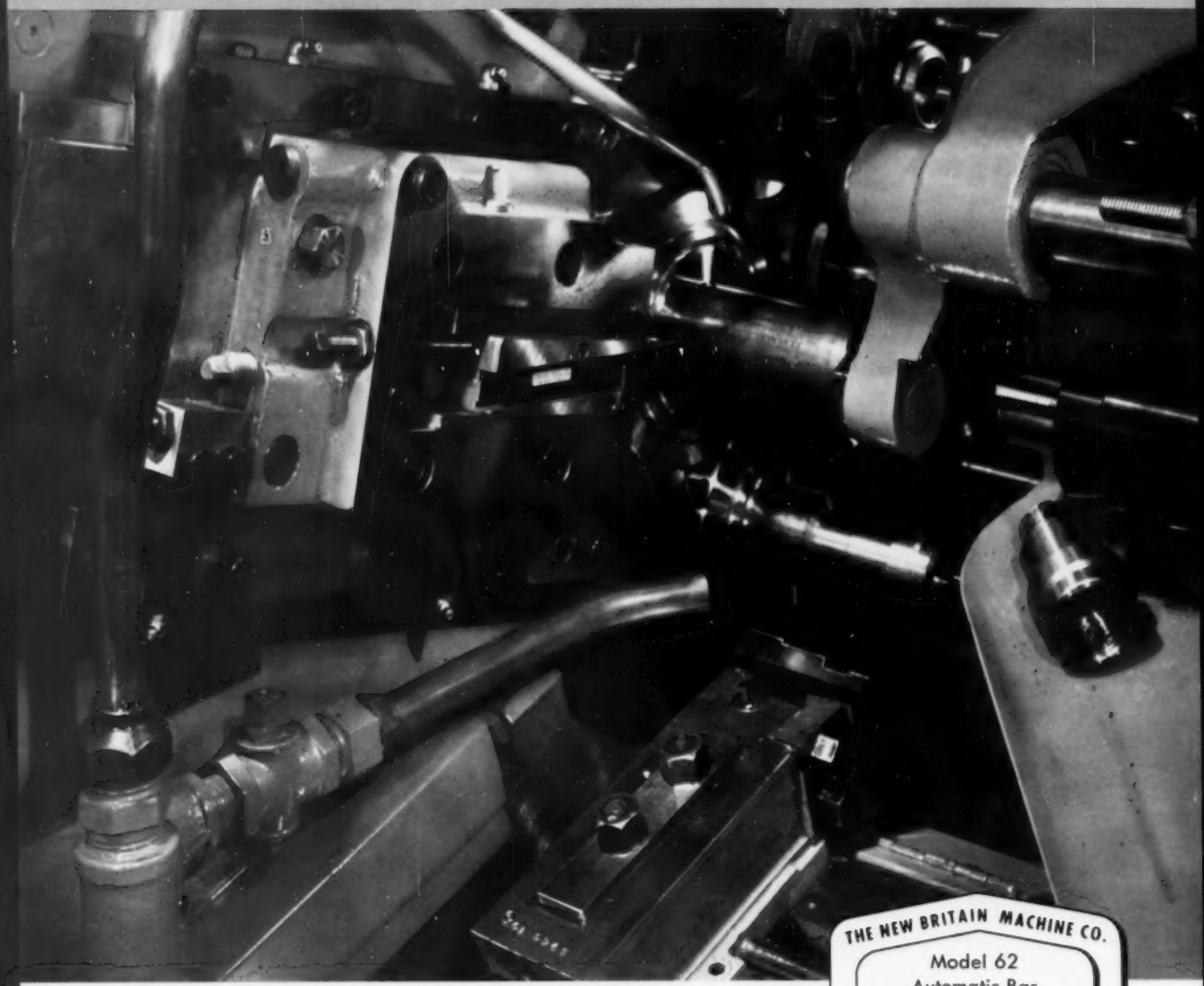
LINDBERG FURNACES

LINDBERG ENGINEERING COMPANY
2452 W. Hubbard Street • Chicago 12, Illinois

everywhere you turn...

You'll find New Britain **+GF+** Copy Lathes are turning out pieces at profit. With a 15-minute setup on a standard model to make just a few pieces, or with an automatically loaded production model to run a million a year, the New Britain **+GF+** approach can make money for you. For a complete color motion picture demonstration in your office, consult your New Britain representative or write The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.





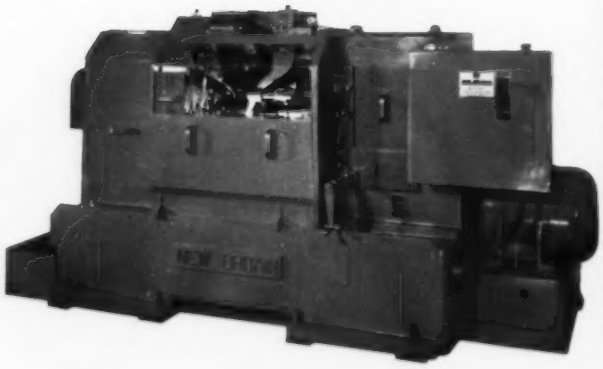
THE NEW BRITAIN MACHINE CO.

Model 62
Automatic Bar
Machine

NB

a rugged cross slide in every position

New Britain Models 60 and 61 Automatic Bar Machines are everywhere you turn. The new Model 62 represents new progress in rugged construction and versatility of setup. Your New Britain Representative can show you how to modernize at a profit. The New Britain Machine Company, New Britain-Gridley Machine Division, New Britain, Connecticut.



HOW TO PROFIT FROM NEW IDEAS in your use of specialty steels

The men above are discussing how Carpenter's *Specialized* Warehouse Service has enabled them to get four times longer life from these punches.*

What about your use of specialty steels? Are you looking for ideas aimed at greater returns . . . savings . . . simplification . . . problem solving? They're all possible with Carpenter's *specialization* on the job.

Lead-off man is the Carpenter Representative. His knowledge and experience can help you make the most from every pound of tool, alloy, or stainless steel you use. And he's backed by Metallurgical Counsel from the Reading Mill.

In addition, a call to the order desk in the Carpenter mill-branch warehouse serving you provides fast information on prices, sizes and grades. Service literature to simplify countless daily procedures is yours for the asking. And it's all supported by the advantage of working with top quality steels that carry producer responsibility directly to you.

Shift your specialty steel program into high gear now. Simply call your nearby Carpenter Mill-Branch Warehouse, Office or Distributor. *The Carpenter Steel Co., 121 W. Bern St., Reading, Pa.*

***Carpenter Specialization saved money**

The punches were breaking after producing only 10,000 to 25,000 carbon rings. Production downtime to replace punches was 40 minutes. After calling in a Carpenter Representative improvement came fast. His recommendation to use Vega tool steel was followed. Now these punches turn out about 100,000 rings. Thus Carpenter's specialized warehouse service has eliminated four out of five replacements of punches costing about $50 each.

Carpenter STEEL

Mill-Branch Warehouse Service

IMMEDIATE DELIVERY from large stocks of specialty tool, alloy and stainless steels.

For iron-ore sintering...

Koppers designed and constructed

SINTERING becomes a more vital consideration each day to production men who must meet the heavy demand for steel. Sinter makes it possible to obtain maximum production from existing blast furnaces. By economizing on coke rate, it also squeezes the most out of the available coke supply.

Koppers designed and constructed the machine shown here for the Weirton Steel Company, Weirton, West Virginia —a division of National Steel Corporation. It is the *first* 8-foot-wide sintering machine in the United States. It has the capacity to make more iron-ore sinter than any other machine in the country.

Weirton Steel's new machine is sintering fines from Labrador ore as well as from Great Lakes ore. It is producing good quality sinter for the company's blast furnaces.

Designing and constructing sintering plants is just one way in which Koppers serves the steel industry. For any kind of metallurgical construction, **you can count on Koppers.** You are invited to consult with our Engineers and Management.

NATIONAL ENGINEERS' WEEK
Engineering ... Builder of a Brighter Future

KOPPERS®

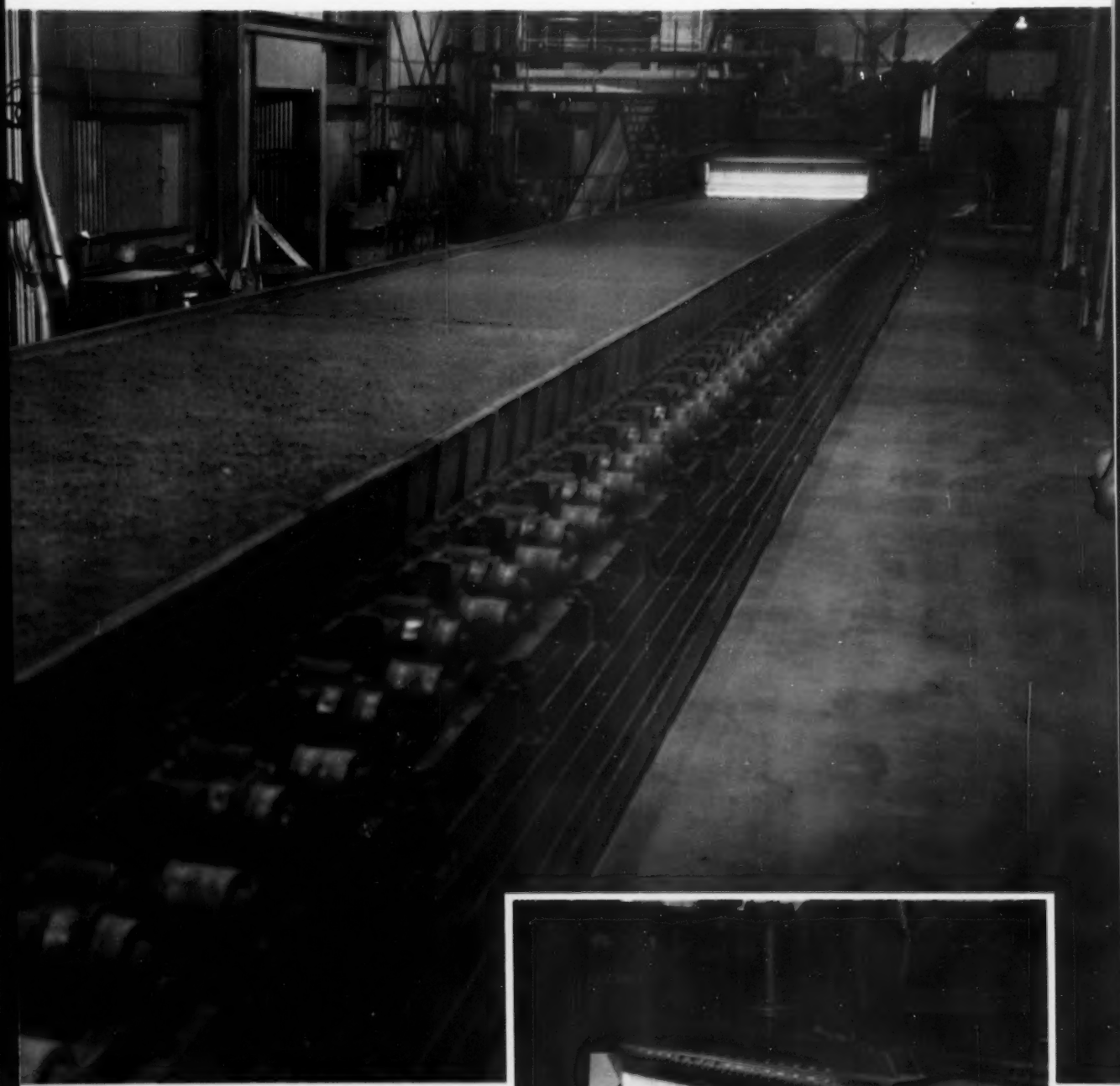
Engineering and Construction Division

FREYN DEPARTMENT

American Ore Reclamation Section

KOPPERS COMPANY, INC., PITTSBURGH 19, PENNSYLVANIA

largest machine in United States



View of Weirton Steel's new 8-foot sintering machine, looking toward feed end. It is the widest iron-ore sintering machine in the United States.

Inset shows ignition furnace and vibrating spreader feeder, which eliminates conventional swinging spout.

A load of compressor valve caps, emerging from Thompson Products' modernized Homocarb furnace after carbon has been restored under Microcarb control. At left are valve stems of 0.40% carbon steel, ready for carbon restoration to a depth of 0.010" in a 2 hour cycle.

Decarb Correction with Microcarb® Saves 4 Ways

FOR THOMPSON PRODUCTS

A real decarb problem has been ended at the Bell, California plant of Thompson Products, Inc. In the production of valves and aircraft parts, decarb kept cropping up at various stages in fabrication. The problem was to correct it without interrupting production by making a special case of each occurrence.

The solution to the problem appeared with Microcarb atmosphere control, which automatically measures and regulates the active carbon inside a Homocarb furnace. Thompson applied Microcarb equipment to one of their 25" x 36" Homocarb furnaces. It didn't take long to prove that Microcarb was the tool needed to lick the decarb problem.

Now this furnace handles any decarb condition on a production basis. It restores either mill decarb or surface carbon lost in hot-working, and replaces surface carbon on any part which has been decarburized below finished specs.

Fourfold savings have resulted:

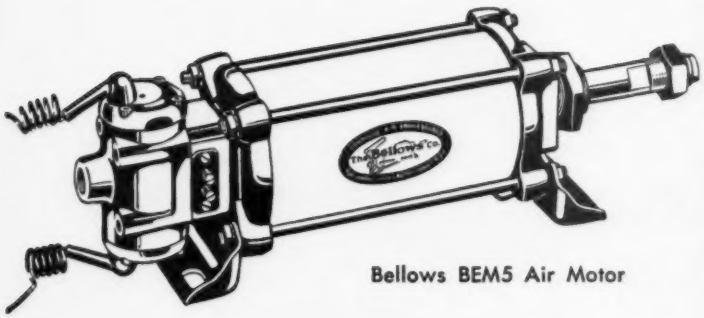
1. No more decarburized products; no rejects due to decarb.
2. No more excessive machining to correct for non-uniform carburizing.
3. Reduction in inspection time.
4. Decarburized mill stock can be restored.

The combination of Homocarb furnaces . . . either pit or horizontal type . . . with Microcarb atmosphere control makes the measurement and control of active carbon inside the furnace just as continuous and automatic as temperature control. Whether specifications demand case carburizing, hardening, homogeneous carburizing or carbon restoration . . . *the carbon you set is the carbon you get!*

If you're now using Homocarb furnaces, Microcarb control can be added by your regular maintenance crews. To explore potential savings and conversion costs, there's an L&N field engineer ready to help you. Just phone the nearest L&N Office or write us direct at 4956 Stenton Ave., Phila. 44, Pa. For details about the workings of Microcarb control, request Catalog TD4-620(2).

LEEDS NORTHRUP

instruments *automatic controls* • *furnaces*



Bellows BEM5 Air Motor

WHY YOU SHOULD BUY the AIR CYLINDER with the Built-in Valve

When it comes to down-right value, the Bellows Air Motor (the air cylinder with the built-in valve) tops them all for both standard air cylinder operations or as a component in new design applications. Not only are you buying a precision-built power unit — but you are buying a complete power unit. No extra valves to buy —dual speed control valves as well as directional valve are integral with the cylinder; no cumbersome, complex piping to install—a single, flexible air hose is all the hook-up you'll need.

You can have your choice of built-in directional valves: 110 volt or 8 volt electrical control, standard or explosion-proof, manual control, or air poppet valve control. Five bore sizes: 1¼", 1¾", 2½", 3⅝", and 4½". Any stroke length.

WRITE FOR THESE TWO BULLETINS:

Contain full data and specifications on Bellows Air Motors. Free. Address Dept. IA 256. The Bellows Co. Akron 9, Ohio. In Canada: Bellows Pneumatic Devices of Canada, Ltd. Toronto.

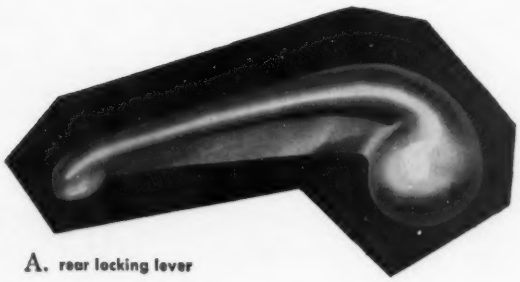
1108-A

The Bellows Co.

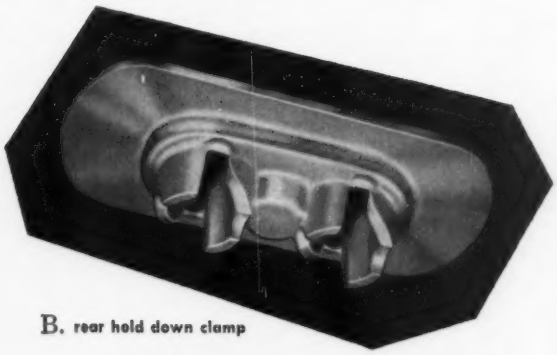
AKRON, OHIO

MUELLER BRASS CO.
FORGINGS
give THUNDERBIRD tops a snug fit the year around

The Motor States Products Division of Detroit Harvester Co.—a major supplier of top assemblies for convertibles—has found Mueller Brass Co. forgings an ideal answer for securely fastening down the tops on the Ford Thunderbird. In a summer shower or in the snow of winter the top is always snug and draft-free. There are a pair of each of the three Mueller Brass Co. forgings shown here used in locking the Thunderbird top securely around the sides and rear deck. The locking lever (A) is incorporated in the top and operates a locking pin that fastens into the rear hold down clamp (B). A pair of side hold down clamps (C) are located just behind each door opening and clamp fasteners on the top hook into these forgings to rigidly hold the top in position. These forgings hold the necessary close tolerances and provide an excellent surface for buffing and chrome plating. In addition, the price is favorable and deliveries are good. For these reasons, as well as their inherent strength and durability, a switch to Mueller Brass Co. forgings can prove advantageous. Write today for our engineering manual (No. H-58565) . . . or better yet, call in one of our engineers to investigate possible forging applications in your products.



A. rear locking lever



B. rear hold down clamp

C. side hold down clamp

• WRITE TODAY FOR THE ENGINEERING MANUAL YOU NEED

Mueller Brass Co. Forgings
Engineering Manual H-58565 ☐

Tuf Stuf Aluminum Bronze Alloys
Engineering Manual H-58563 ☐

600 Series Bearing Alloys
Engineering Manual FM-3000 ☐

Copper Base Alloys in Rod Form
Engineering Manual FM-3010 ☐

METALS AND ALLOYS REVIEW

by FRANK M. LEVY, Director of Research

The other day one of our sales engineers stopped in to discuss gear applications and the subject got around to the amount of zinc permissable in gear and bearing alloys. Engineering books state that zinc is not desirable in bearing alloys. While this statement is true as regarding the commonly used copper-tin and copper-tin-lead alloys, it does not necessarily apply to other types of alloys. The 600 series bearing alloys, in which I am keenly interested, depend upon a high zinc content along with several other metal constituents to provide them with their fine bearing properties.

My explanation to our sales engineer was somewhat as follows: The question as to whether or not zinc is detrimental in a bearing alloy depends upon the remaining constituents in the alloy. A comparatively small amount of zinc is detrimental in a phosphor bronze alloy containing 80% copper, 10% tin and 10% lead. A zinc content of 4% is permissible in a bearing alloy containing 88% copper, 4% tin and 4% lead when used in an application not subject to heavy loads. In these alloys the tin combines with some of the copper to form a hard copper-tin constituent which is distributed through the soft copper matrix, or mat of copper. The higher the percentage of tin present, the greater the quantity of hard copper-tin constituent formed. Zinc also combines with copper increasing the hardness of the matrix. Therefore, when zinc is present along with a high tin content, the matrix becomes too hard and is "out of balance" resulting in poorer bearing qualities.

In the 600 series, copper, silicon, manganese, etc., are present with zinc. There is sufficient manganese present to combine with the silicon to form a purple manganese silicide which is embedded in the copper-zinc matrix. *Since the manganese-silicide constituent has a much higher micro hardness than the copper-tin constituent in phosphor bronze, the matrix of the 600 series alloys can have a higher hardness without impairing the bearing properties. In this instance, zinc is not detrimental but desirable because it produces an alloy with a high Brinell hardness which resists pounding and distortion.*

Like many engineers, we, too, were skeptical of the bearing properties of the first 600 alloy developed. A manufacturer of worm driven truck transmissions was having difficulty with the failure of chill cast high tin bronze gears in busses used in the hilly section of Los Angeles and Pittsburgh, and solved his problem by using gears made from 600 metal.

Since that time, we have had over a hundred successful applications on difficult bearing problems where cast bearing bronzes have failed. An interesting observation is that once a customer uses 600 alloys, he not only finds other applications, but continues to use it over a long period of years. Our original customers are still on our books.

In conclusion, we agree that zinc is detrimental to the bearing properties of the phosphor bronze type of alloys, but is of benefit to the 600 series alloys, *as it makes a harder matrix*, permitting the alloy to resist pounding action better than the softer phosphor bronze alloys.

I've just about run out of space for this time but we'll have another subject for discussion later. If you have any problems or questions about non-ferrous alloys, just write me here at Mueller Brass Co. and we'll see what we can do.

MUELLER BRASS CO.

PORT HURON 24, MICHIGAN

170

Republic Stainless cuts cost of

Operator at left is removing scale accumulation from Clepco immersion heater casing made from Republic ELECTRUNITE® Stainless Steel Tubing. Any normal cleaning procedure may be followed without risk of damage to unit. And if your product demands cleanliness, the lustrous, smooth-finished surfaces of stainless tubing are clean, sanitary, and easy to keep that way. Solid stainless throughout, maintenance and replacement costs are reduced.

Operator at right is shaping 2" Republic ELECTRUNITE Stainless Steel Tubing to a bullet nose by spinning it under flame. Workability of this tubing makes it easy to fabricate. For heater casings, Cleveland Process uses both Types 304 and 316 Stainless Tubing which they find highly satisfactory for either acid or alkaline solutions—at temperatures ranging from 100° to 600°.

REPUBLIC

REPUBLIC STEEL

World's Widest Range of Standard Steels

Tubing solves breakage problem...

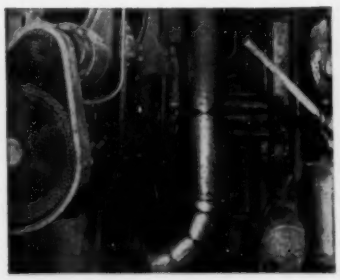
Clepco immersion heater casings

The Cleveland Process Company of Cleveland, Ohio, manufacturers of Clepco immersion heaters, had a twofold problem. The tube-like casings they use to house heating elements were fabricated from a brittle imported material. Scale removal was particularly hazardous—often resulting in a cracked or broken casing. Furthermore, the material itself, although an effective insulation, was expensive.

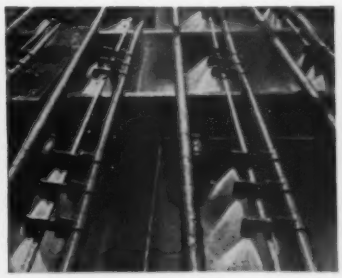
To solve these problems, Cleveland Process switched to Republic ELECTRUNITE Stainless Steel Tubing for heater casings. They found ELECTRUNITE Stainless Tubing easy to fabricate, having consistently uniform diameter, wall thickness, concentricity, strength and ductility. But most important, ELECTRUNITE completely eliminated breakage and substantially reduced material costs.

Made of long-lasting Republic ENDURO Stainless Steel, this tubing provides strong resistance to corrosion, oxidation and scaling at high temperatures. Where strength is a requirement ELECTRUNITE Stainless Tubing is ideal—providing an extremely high strength-to-weight ratio.

This tubing may be the very material you need to improve your product or process. For detailed information about the many cost-saving advantages of Republic ELECTRUNITE Stainless Steel Tubing—including sizes, gages and analyses—send coupon today for new, illustrated 60-page booklet.



REPUBLIC ENDURO® STAINLESS PIPE SAVES COSTS in paper mills. Section shown above is part of a piping system that conveys the highly corrosive pulp mixture to the processing machines. Where corrosion-resistance is vital to cost savings, the extra expense of this long-lasting piping is an inexpensive investment in long-range economy.



REPUBLIC SEMI-RIGID PLASTIC PIPE SAVES COSTS in cooling towers. Original pipe had to be replaced every four months in this cooling installation near coke ovens. A constant bath of corrosive steam saturated with hydrochloric acid soon destroyed it. Two years ago, Republic Semi-Rigid was installed with excellent results: no sign of damage to this date.

REPUBLIC DEKORON®-COATED EMT SAVES COSTS of electrical conduit in chemical plants. Wherever the atmosphere is corrosive, unprotected metal parts take a beating. But Dekoron-Coated EMT shrugs off corrosion. The tough, polyethylene coating over the galvanized finish gives double protection to electrical raceways. Send coupon for facts.

STEEL

and Steel Products

REPUBLIC STEEL CORPORATION
3104 East 45th Street • Cleveland 27, Ohio

Please send me more information on:

- ☐ Republic ELECTRUNITE Stainless Steel Tubing
- ☐ Republic ENDURO Stainless Pipe
- ☐ Republic Plastic Pipe
- ☐ Republic Dekoron-Coated EMT

Name_____ Title_____

Company_____

Address_____

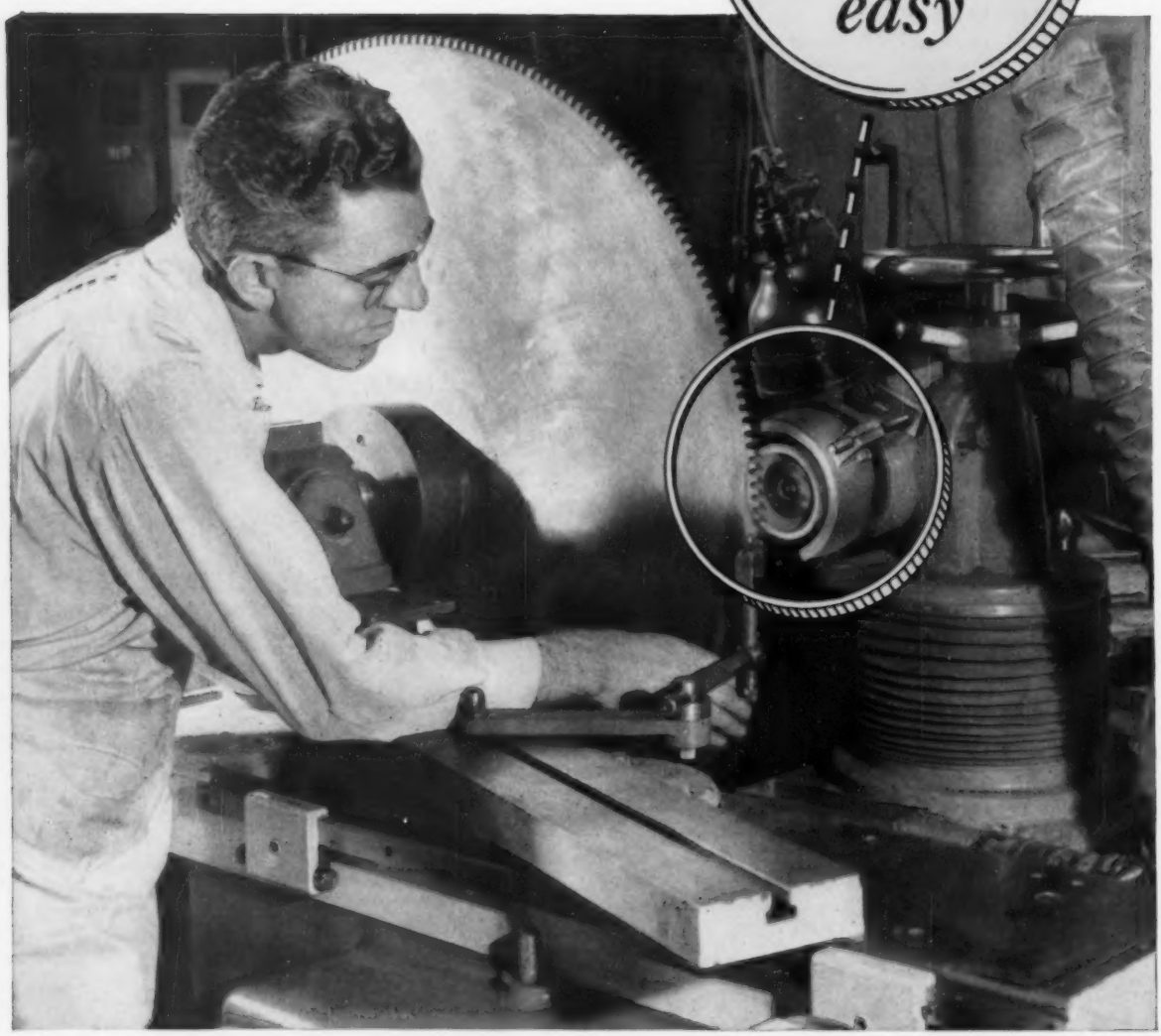
City_____ Zone____ State_____

K-9699

Fastest, most versatile cutter and tool grinder ever built . . .

The Norton No. 20 with the tilting wheel head...

makes hard jobs easy



Fast Set-Up For A Big Job. Ordinarily difficult to sharpen because of interference problems, this 39″ diameter special cutter is easily handled on a Norton No. 20 Cutter and Tool Grinder in the Carrier Corporation's Syracuse, N. Y., plant. The cutter is suspended vertically behind the table and base, while the No. 20's tilting wheel head is tilted down for backing off the cutter's 364 carbide teeth to the proper relief angle. Wheel guard is removed to show Norton cup diamond wheel.

If wrestling with tricky set-ups is slowing down your cutter and tool grinding operations, take a good look at the Norton No. 20 Cutter and Tool Grinder. It's especially designed for quick, easy set-ups of hard-to-handle workpieces.

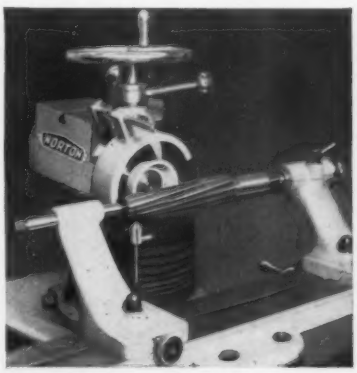
You can tilt the wheel head up to 15° above or below horizontal and swivel it a full 360°. This means no more time-wasting "trial and error" tactics — and new speed and economy when grinding taper reamers, step counterbores, form tools, milling cutters and other ordinarily troublesome jobs.

Other advanced features that add up to money-saving performance include: long table traverse and wheel slide travel . . . integral motor spindle . . . centrally located column elevating hand wheel . . . wheel slide graduated dials readable from any position and automatically lubricated table ways.

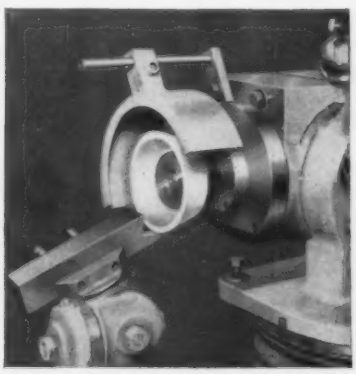
It will pay you

to get further facts on how the No. 20 can reduce your grinding time and costs. See your Norton Representative. Or write us direct for Catalog 189-4. The Norton Lease and Purchase Financing plans enable you to modernize while conserving your capital and remember: only Norton offers you such long experience in both grinding wheels and machines to help you produce more at lower cost. NORTON COMPANY, Machine Division, Worcester 6, Mass. *In Canada:* J. H. Ryder Machinery Co., Ltd., Toronto 5.

It Tilts! Chief source of the No. 20's remarkable versatility and speed is this wheel head that simplifies set-ups. It tilts up to 15° above or below horizontal and swivels through 360°. Accurate graduations provide for all adjustments and positive clamping devices assure stability during operation.



No Problem — Now. The tilting wheel head on the No. 20 is set at an 8° angle while grinding this spiral taper reamer. By this method, the clearance angle is kept constant for the full length. No more compromising or experimenting on this important job.



Grinding Form Tools Is Simplified with the No. 20's tilting wheel head. Here it is set at a 2° angle, while the tool is ground in a single set-up and wheel truing is minimized. Note the sharp corner which has been maintained on the tool.

Compact and Streamlined, the Norton No. 20 matches cost-cutting performance with space-saving design. Duplicate controls permit operation from front or either side.

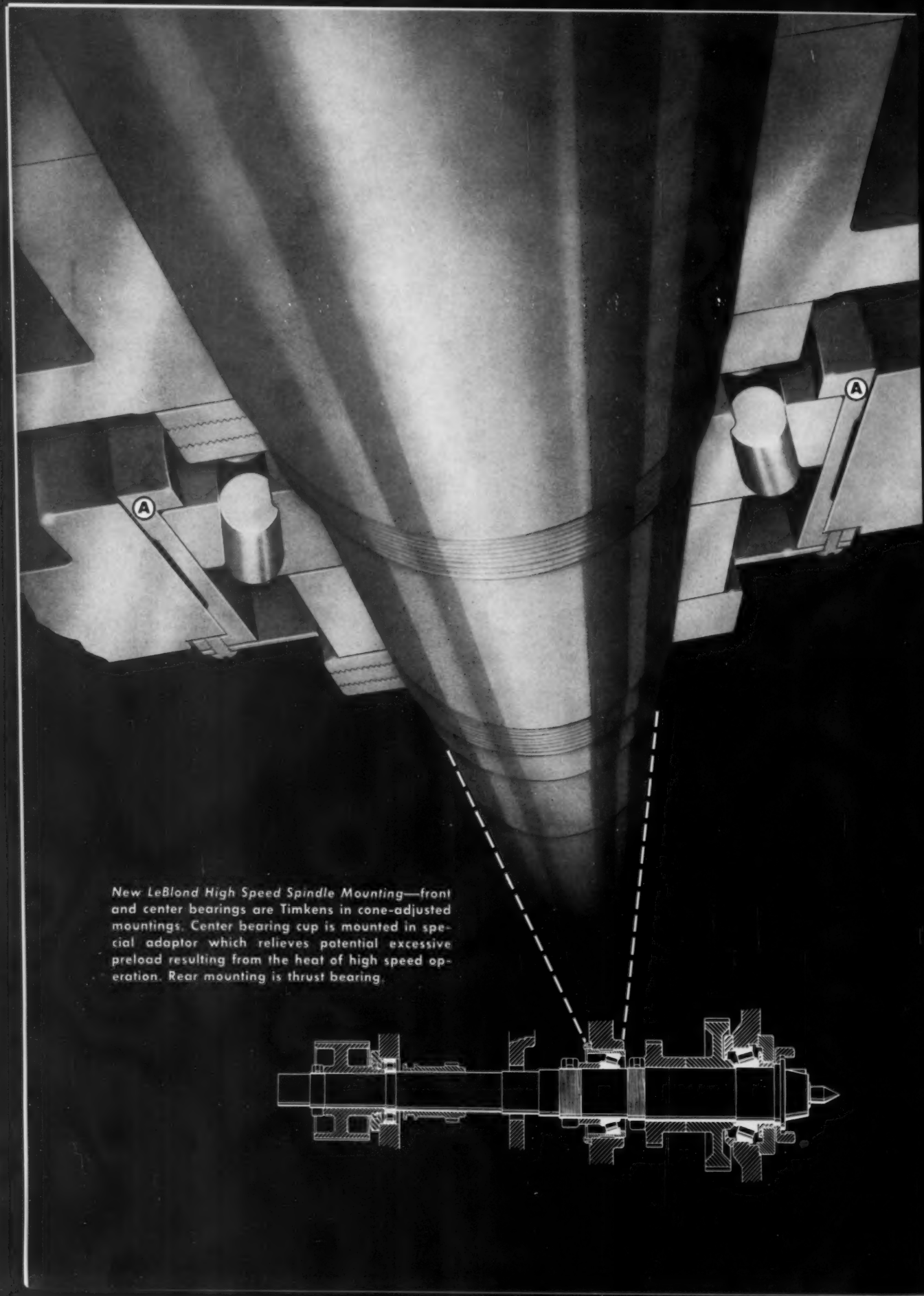
To Economize, Modernize With NEW

NORTON

GRINDERS and LAPPERS

Making better products . . . to make other products better

District Sales Offices: Worcester • Hartford • New York • Cleveland • Chicago • Detroit



New LeBlond High Speed Spindle Mounting—front and center bearings are Timkens in cone-adjusted mountings. Center bearing cup is mounted in special adaptor which relieves potential excessive preload resulting from the heat of high speed operation. Rear mounting is thrust bearing.

before you buy a lathe for high-speed carbide turning... check spindle bearing design

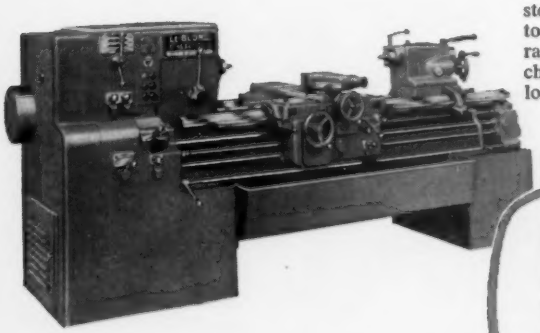
LeBlond construction gives you safe high speeds with long-lived precision. Higher and higher speeds for efficient carbide turning—that's the order of the day in lathe design. But when you talk about 2000 rpm on a 16" H.D. lathe, you've got to think about the new problems created by high speeds.

Heat, generated in a hurry, produces different rates of expansion radially and axially in the bearings and spindle. As a heavy spindle is revved up to 2000 rpm, heat is generated in the bearings. Expansion occurs radially in the bearings and spindle before the heat has time to dissipate and cause a proportionate axial expansion in the spindle. *This is the dangerous interim period!* Unless the bearings can be relieved, excessive preload may cause undue wear and loss of precision. Even failure in the extreme case.

Here's how LeBlond solves this problem. The front Timken bearing is mounted on the spindle and directly in the headstock. The center bearing cup is mounted in an adaptor (A) whose land is .004" smaller in diameter than the headstock bore. The other end of the adaptor is press fitted. As the bearing temperatures rise in operation, the center bearing and adaptor expand radially into the slight clearance. Both front and center bearings are thus relieved from extreme preload—failures due to excessive tightness and wear are eliminated. The original factory-set preload can handle both high and low speeds—no need to reset bearing adjustments in the field.

This is typical of the under-the-surface quality engineered into every detail of LeBlond Lathes. To give you the operating speeds you need, with the safety, precision and long life you expect when you purchase a LeBlond.

Whatever your turning needs, high speed, high horsepower or high production, LeBlond has a lathe in its complete line to do the job. 76 different models to choose from. See your LeBlond Distributor or write today.



Other important features of the new LeBlond 16" Heavy Duty Lathe include combination gear-belt drive headstock, 18 geared speeds, 9 timing-belt-driven speeds up to 2000 rpm, free running spur gear design, four-way rapid traverse, one-piece apron, totally-enclosed quick-change box, hardened and ground steel bedways, thrust-lock tailstock. Ask for Bulletin HD-126A.

... cut with confidence

LeBLOND of Cincinnati

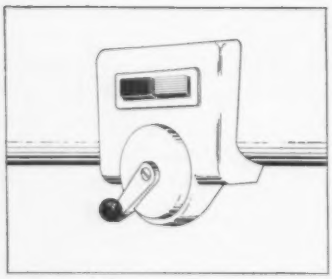
THE R. K. LEBLOND MACHINE TOOL COMPANY • CINCINNATI 8, OHIO

World's Largest Builder of a Complete Line of Lathes • for more than 69 years

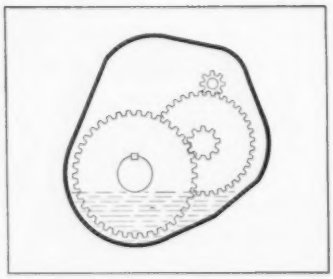
2 New CINCINNATI PRESS BRAKES

THIRTY TON - - - - 2-30 SERIES
FIFTY TON - - - - 3-50 SERIES

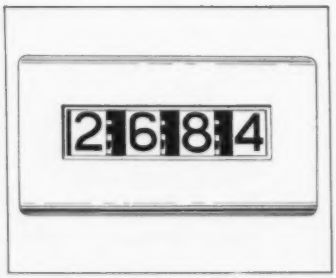
COMPETITIVELY PRICED



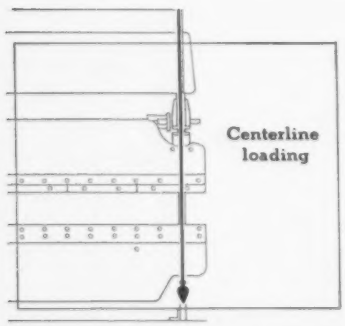
Front controlled, variable speed drive, 20 to 50 strokes per minute.



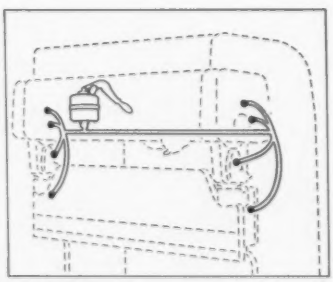
Completely enclosed transmission, running in oil.



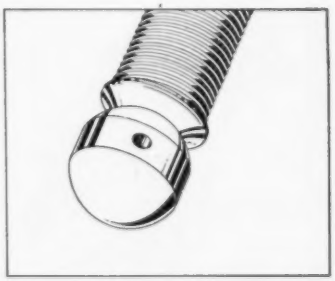
Two micrometer indicators, one at each end of the ram—easy to read and accurately record the amount of adjustment and tilt.



Centerline loading prevents weaving of the housings and insures accurate bends.



Centralized pressure lubrication system.



Ball end on the ram adjusting screws permits tapering of the ram for fade-out work.

THE CINCINNATI SHAPER CO.

CINCINNATI 25, OHIO, U.S.A. SHAPERS • SHEARS • BRAKES

2-30 SERIES

This new 2-30 Series Cincinnati All Steel Press Brake has a capacity of 14 gauge x 6′ mild steel.

Look at these unusual standard features:

2½″ stroke—12″ shut height—9″ throat.

Distance between housings 5′-2″—overall die surface, 6′-0″.

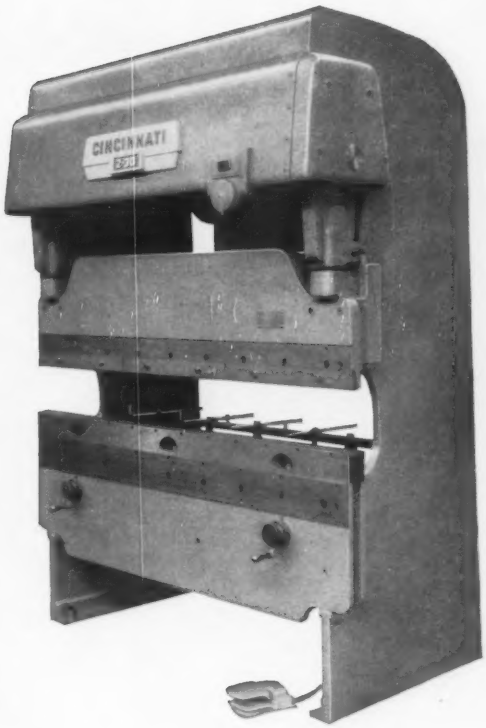
Front controlled, variable speed drive, 20 to 50 SPM. 4″ manual ram adjustment including ram tapering adjustment for fade-out work (power adjustment available as extra feature).

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



3-50 SERIES

These new 3-50 Series Cincinnati All Steel Press Brakes are built in two lengths and have a capacity of 10 gauge x 6′ mild steel. Investigate these unusual standard features: 3″ stroke—12″ shut height—12″ throat—distance between housings 6′-6″ or 10′-6″—overall die surface 8′-0″ or 12′-0″—front controlled, variable speed drive, 20 to 50 SPM.

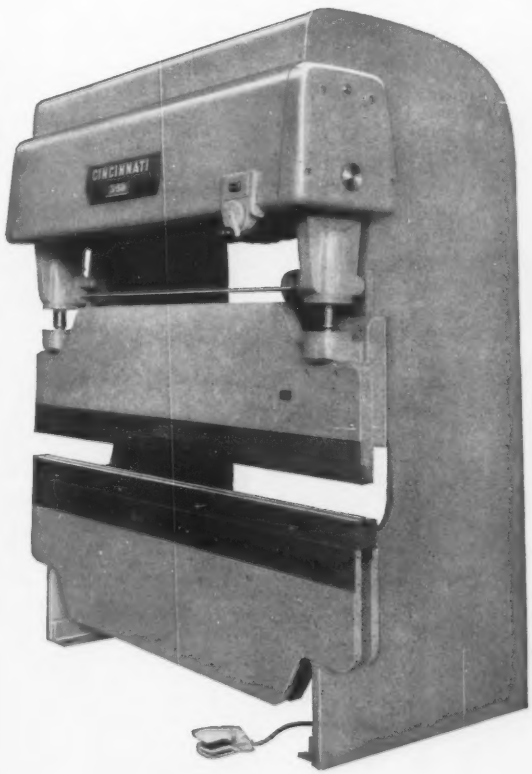
5″ motorized ram adjustment, including ram motor and control, complete with ram tapering adjustment for fade-out work.

Bronze swivel end-guide bearing for accurate endwise alignment, even when tilting ram.

Brushless electro-magnetic brake and clutch.

Deep bed and ram, planed and drilled for 5¾″ angles.

Micrometer indicators on both ends of ram for fast, accurate setting.



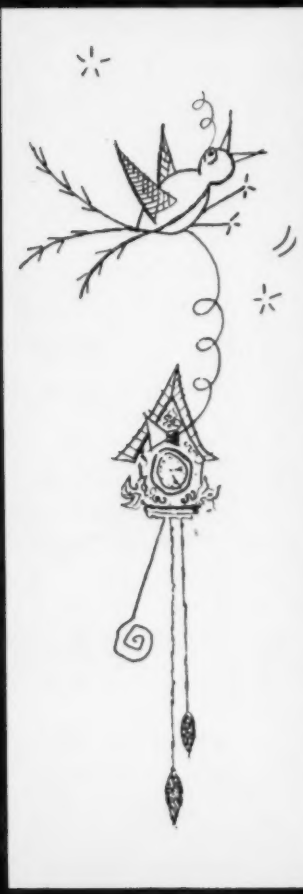
YOUR TURNING-TIME CONCEPTS

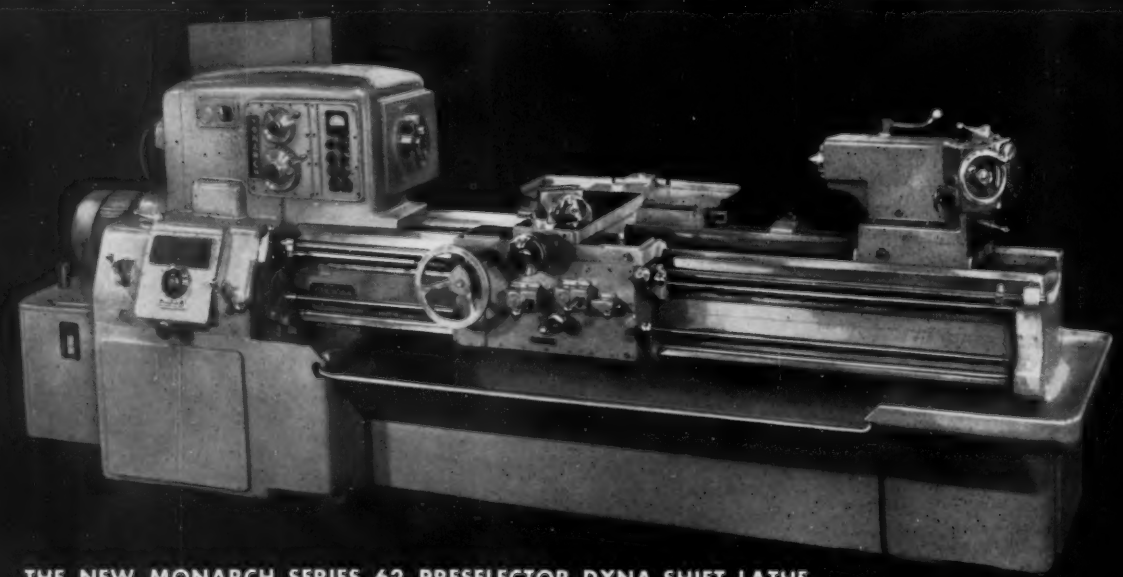
Set it—forget it! That's the story of the Preselector Dyna-Shift. It's the brain Monarch has built into the new Series 62. With it *this* machine will give a greater ratio of metal removing hours to work hours than you ever dreamed possible.

When setting up, merely dial the surface speed wanted and the first diameter to be turned—the Dyna-Shift computes the R.P.M. and makes the shift instantaneously and automatically. *(Time-saver #1).* Then, to maintain this surface speed on successive diameters, set the work diameter selectors. Every speed change thereafter, on *every* piece in the run, takes place automatically with but one fast dial setting and movement of the work start and stop lever. *(Time-saver #2).* What's more, here at last is the lathe with a speed range so wide as to take care of all your needs. Its 20 H.P. drive gives you 36 different spindle speeds in a range from 14 to 1750 R.P.M., a ratio of 1 to 125. *(Time-saver #3).*

Nor are the time-saving features of the Series 62 limited to the Preselector Dyna-Shift headstock. There's four-way power rapid traverse which cuts tool positioning time on the average of 50%. There's the totally enclosed and automatically lubricated gear box and end gearing. There's a completely new two speed tailstock. Add them all up and you get a new lathe concept that means Production with a capital P!

You will want to know all about these and many other features in detail. Send the coupon for the greatest turning news in years!! . . **The Monarch Machine Tool Company, Sidney, Ohio.**





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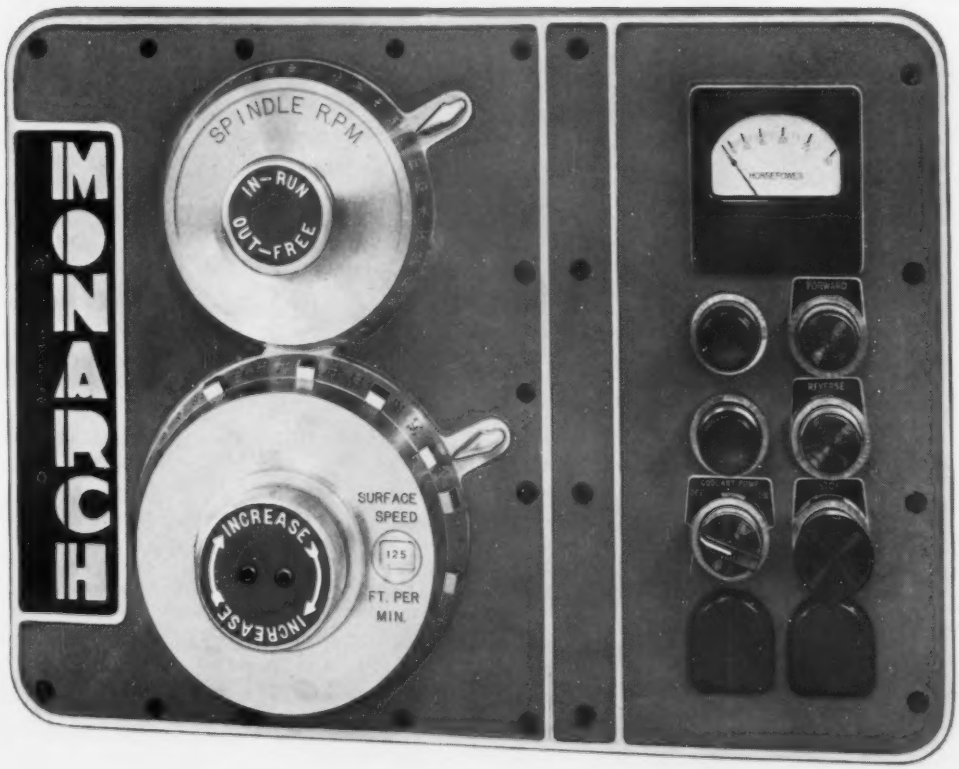

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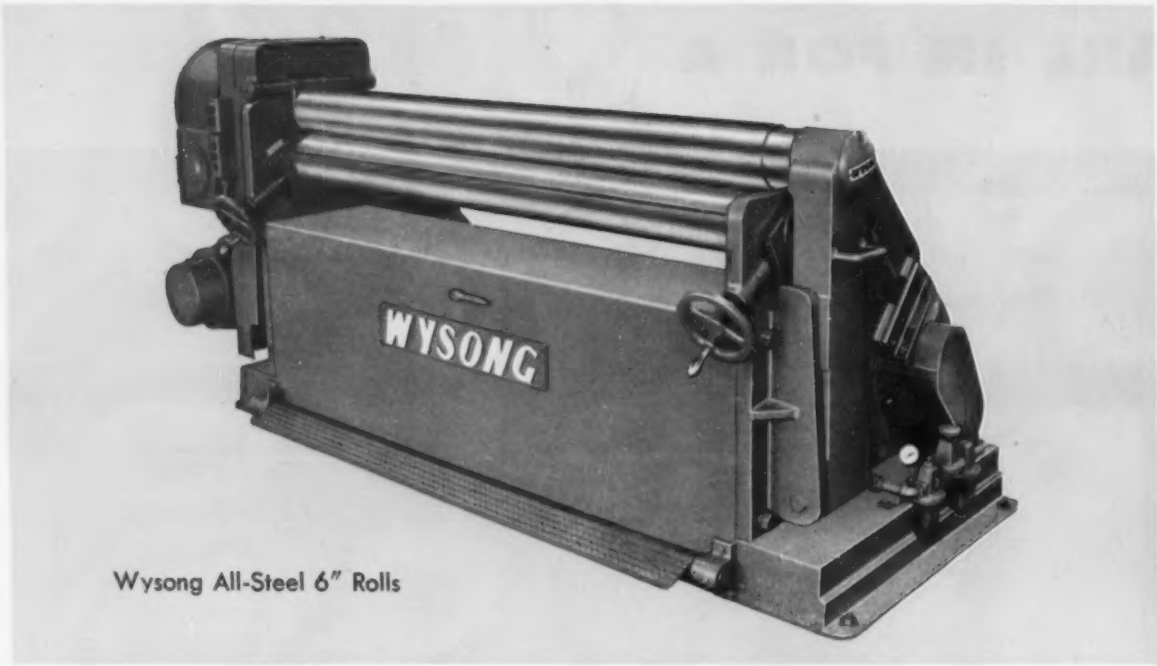
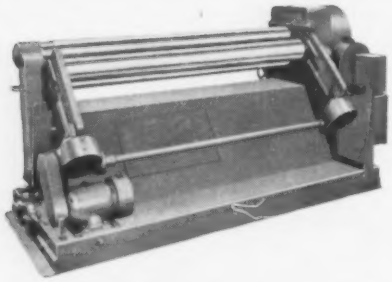
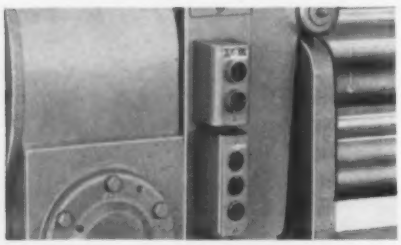


Wysong All-Steel 6" Rolls



Rear view. Motor at left provides power for adjustment of rear roll. Air vitalizer section of air operation of drop end is shown on left end.



Top push button panel controls rear roll. Lower panel provides stop, start and reverse for roll drive.

Hand lever controls air valve for lifting top roll.

New WYSONG All-Steel 6-INCH ROLLS

Wysong All-Steel Bending Rolls have created a *new* standard for safety and ease of operation. They are available in 4¼ inch, 5 inch and 6 inch diameters and working lengths from 36" through 120".

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DESIGNING WITH ALUMINUM

NO. 17

This is one of a series of information sheets which discuss the properties of aluminum and its alloys with relation to design. Extra or missing copies of the series will be supplied on request. Address: Advertising Department, Kaiser Aluminum & Chemical Sales, Inc., 1924 Broadway, Oakland 12, California.

REDESIGNING FROM STEEL TO ALUMINUM SHEET

The development of versatile, high-strength aluminum alloys has enabled many manufacturers to convert their metal products to aluminum from other materials.

Redesign is not complicated, and tremendous improvements often may be gained by application of aluminum. Advantages include easy forming, greater facility of handling, lower shipping costs, longer service life, elimination of need for paint and other protective coating, reduced maintenance and more attractive appearance, along with other desirable features.

Among the especially striking applications in which aluminum parts may be introduced are those involving the redesign of sheet steel products into aluminum. ("Sheet" materials in both metals are those up to .249" in thickness.)

This process requires no more than ordinary design acquaintance with the physical and mechanical properties of aluminum alloys. Aluminum may be formed and joined by any of the familiar methods for metal fabrication, and by a number of other dependable means that most other metals do not accept readily. For example, deep cup-shaped parts may be made in one piece accurately and to finished dimensions without joints from aluminum by impact extrusion or spinning. Such parts are made from steel by expensive forming or hot forging processes followed by final machining and forming of body and base components.

Another simple forming method that is accepted by few metals other than aluminum is "stretch forming," in which the aluminum sheet is stretched over a male die, and provides three-dimensional contours of considerable dimensional accuracy.

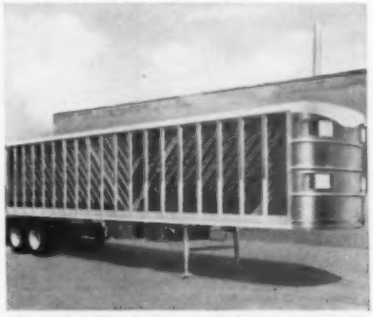
Built-up Structures

Where structures are built-up from several sheet metal pieces, aluminum may be joined by stitching, stapling, adhesive bonding and other quick-assembly methods. These have a very distinct advantage over the more expensive and time-consuming assembly procedures suitable for steel sheeting. For this reason, designing with aluminum sheet materials very often offers important savings in manufacturing costs plus the functional advantages of the finished aluminum parts.

Sheet products generally fall into two classes; load-bearing parts and comparatively unstressed parts. Sheet pieces and assemblies of the latter sort include covers, hoods, ducts, light housings and similar parts that are expected to carry only their own weight plus the nominal pressure of ordinary handling and wear. Such parts often are designed successfully by the experienced designer's "rule of thumb" with no detailed stress analysis made or required.

Designing Unstressed Aluminum Pieces

When designing these comparatively unstressed aluminum pieces and assemblies as replacement for steel, designers need consider only the comparative stiffnesses (elastic moduli) of the two metals. Calculations have shown that an aluminum sheet 42% thicker than one of steel will have approximately an equal stiffness and dent resistance.



Livestock trailer designed by Kaiser Aluminum with modifications by Wilson Trailer Company shows extensive use of stressed aluminum sheet components.

Thus, if the design of a sheet steel hood, cover, enclosure or similar unstressed unit has been calculated as adequate, it may be replaced in aluminum simply by an increase in sheet thickness of less than one-half. Even with the thickness increase, weight will be reduced by more than one-half.

It must be remembered that some sheet metal parts of this nature are constructed according to a designer's personal inclination, calling for some arbitrary minimum of metal gauge, regardless of whether the product's end use will call for such rigidity. Where this has been done, the replacement aluminum sheet often may be no thicker than the steel, or in any case may be of a gauge increase less than the prescribed 42%. This is especially true of smaller parts where the "l/r" ratio of gauge to span is favorable. In such cases, manufacturing costs may be reduced further by actual stress investigation of the parts. The same principles, of course, may be applied in designing stressed aluminum sheet members.

Designing Loaded Aluminum Pieces

Loaded sheet-metal members are found in many design applications. They are used as chutes and guides, as table-type surfaces, as webbing in composite beams and frame structures, in the form of tank shells, and in a multitude of other components where the characteristics of sheet are desirable. The strength and durability of aluminum sheet in such applications are remarkable. For example, a 13′ x 8′ truck platform frame, designed in aluminum sheet materials as a counterpart of a steel assembly, has been found to weigh only 144 pounds—one-third the weight of the steel frame. This formed aluminum sheet structure accepts compression from a 22,500 lb. axle loading, while offering a safety factor of 4½ over the ultimate strength of its metal. Similarly, an all-aluminum livestock transport trailer (see illustration), designed by Kaiser Aluminum with modifications by Wilson Trailer Co. to meet special operating conditions, shows numerous applications of stressed aluminum sheet and weighs some 2800 lbs. less than comparable equipment of ordinary materials. The structural qualities of aluminum sheet materials have been proved in many other industrial applications as well.

Design of Stressed Aluminum Pieces

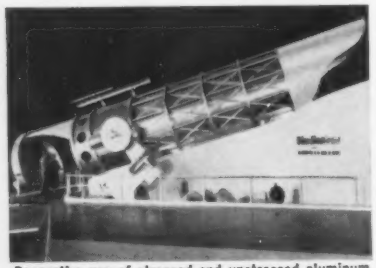
Redesign in aluminum of stressed steel sheet members will pose no difficulty to designers who are familiar with the basic rules for computing structural strength. Aluminum alloys have a modulus of elasticity established as 10,300,000 psi, as compared with a modulus of about 29,000,000 for structural steel. The relative stiffness characteristics of the two metals, then, are in the proportion of 29,000,000/10,300,000, or (approximately) 2.8 to 1. It will be recalled that the rigidity of a section increases as the cube of its depth. For this the stressed aluminum sheet dimension need be increased by only the prescribed 42%, so as to equal its steel counterpart in stiffness.

CONTINUED ON NEXT PAGE

(Advertisement)

DESIGNING WITH ALUMINUM Cont.

Most materials, including aluminum, tend to lose strength as their temperature rises. Aluminum offers a valuable measure of safety against this effect because of its high conductivity and specific heat. The specific heat of aluminum alloys permits them to absorb approximately twice as much heat energy as



Decorative use of stressed and unstressed aluminum sheet at Kaiser Aluminum exhibit at Disneyland.

steel before reaching a given temperature. In addition, the capacity of aluminum to carry heat away from the point of application is about four times that of steel alloys. This resistance to temperature rise and the rapid distribution of heat energy often enables aluminum structures to operate successfully in above-normal temperature conditions.

This resistance to above-normal temperatures extends not only to strength characteristics, but to corrosion-vulnerability as well. The increased tendency of steel to rust in elevated temperatures is familiar to anyone who has observed the appearance of ferrous parts in and around above-normal temperature processes. Accelerated oxidation may be combatted in steel only by means of carefully applied and maintained protective coatings. Aluminum members, protected by their own self-produced film of oxide, are much less subject to attack and require no such intensive maintenance measures.

In many applications, the use of a machine or structure is subject to regulations imposed by law or by advisory bodies. For purposes of this nature the light weight, heat-resistant, non-sparking qualities of aluminum alloys have been accepted enthusiastically, and rules for their design have been established.

For example, where aluminum sheet is to be applied as a replacement for steel in cargo tank trucks for carrying petroleum products and corrosive liquids, the Interstate Commerce Commission has provided a formula to be used in determining the equivalent gauge for materials other than steel.

This formula is:

$$A = B\,x^3\sqrt{\frac{3 \times 10^7}{C}}$$

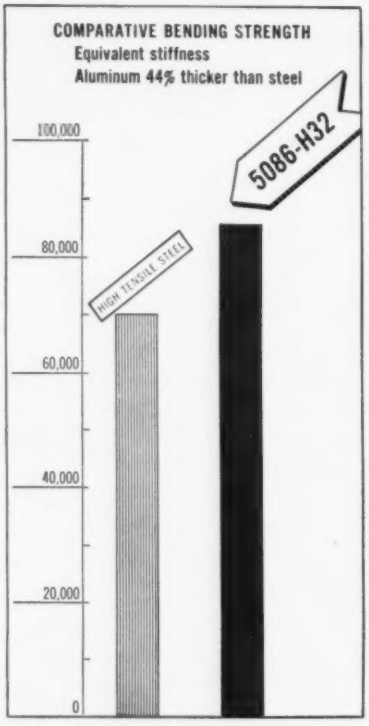
A means — Thickness for materials other than steel

B means — Steel thickness

C means — modulus of elasticity of the alternate material

A 6000-gallon aluminum semi-trailer transport tank, 5′ 8″ in diameter, designed by Kaiser Aluminum in accordance with these regulations, is self-supporting for a span of 26 feet between kingpin and center of rear tandem. Its construction is of aluminum sheet only .156″ in thickness below the tank center line and .125″ thick above.

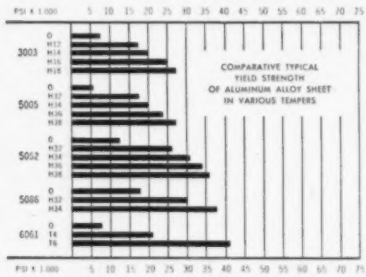
This unit permits a tremendously increased payload, with the additional features of a cooler cargo because of higher sun-heat reflectivity, and a much greater capacity to disperse heat from defective brakes or similar sources of danger. It typifies the advantages gained by use of sheet aluminum in appropriate applications.



HIGHEST BENDING STRENGTH

Designers seeking to take advantage of these superior metal characteristics will find a great variety of aluminum sheet types available. Diversities of alloy, temper and cladding provide aluminum sheet material for almost any purpose. Yield strengths of aluminum sheets range from about 5000 psi in the pure, untreated materials to about 75,000 psi in heat treatable alloys. The latter figure will be recognized by designers as superior to that of many steels. Yield strengths in the neighborhood of 20,000 to 30,000 psi are common to many alloys, with only moderate hardening treatments.

Frequently, the designer in aluminum encounters applications in which he would prefer to use a basic metal of high strength, but with a surface offering especially high resistance to corrosion. For such purpose, "clad" aluminum materials have been developed and are widely used. These sheets are prepared by rolling together the desired alloys to create a dependable and permanent bond. Aluminum sheeting may be clad both sides, and may be obtained clad on one side only by special inquiry, and is offered in both flat and tubular forms.



For applying decorative effects to aluminum parts, many and varied finishing processes have been developed. Perhaps the best known is anodizing, an electrical treatment by which a film of oxide is formed suitable for dyeing in a wide range of colors. Electroplating with other metals may be applied readily, as may numerous types of chemical etching and coating. Satin finishes and other soft-reflection surfaces may be attained by mechanical abrasion or tumbling. For irregularly shaped pieces, difficult to finish by ordinary means, an electro-brightening process removes surface impurities and brightens the overall effect. Paints, lacquers and varnishes may easily be applied to properly prepared aluminum surfaces, which thereafter will not be stained or discolored, as from rusting steel.

These improvements in function, appearance and manufacturing costs have been applied to metal products in many fields by the use of aluminum. More detailed assistance with design, alloy selection and fabrication procedures are obtainable through the Kaiser Aluminum sales office listed in your telephone directory, or one of our many distributors. Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office:* Palmolive Bldg., 919 North Michigan Avenue, Chicago 11, Ill. *Executive Office:* 7475 Kaiser Bldg., Oakland 12, Calif.

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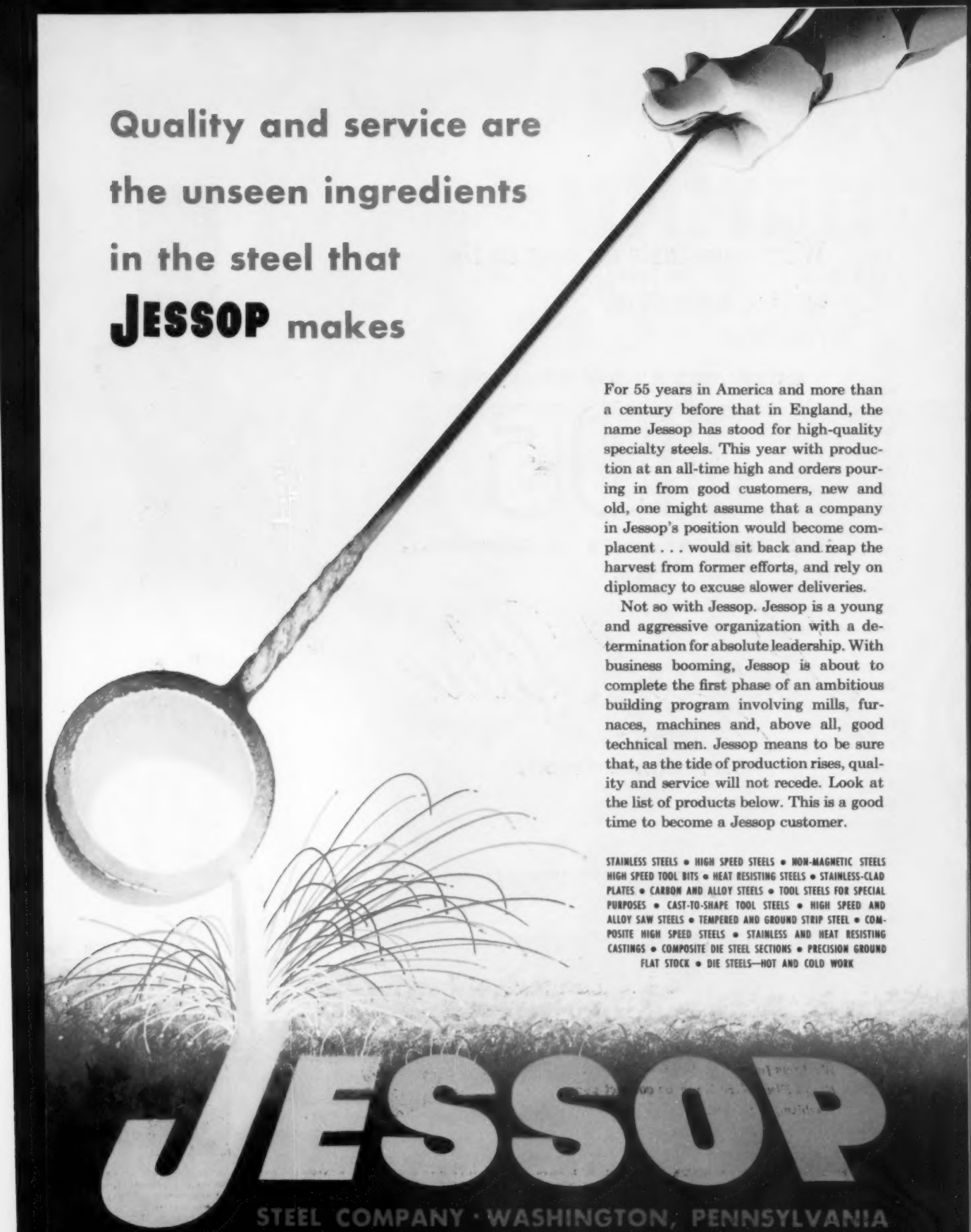

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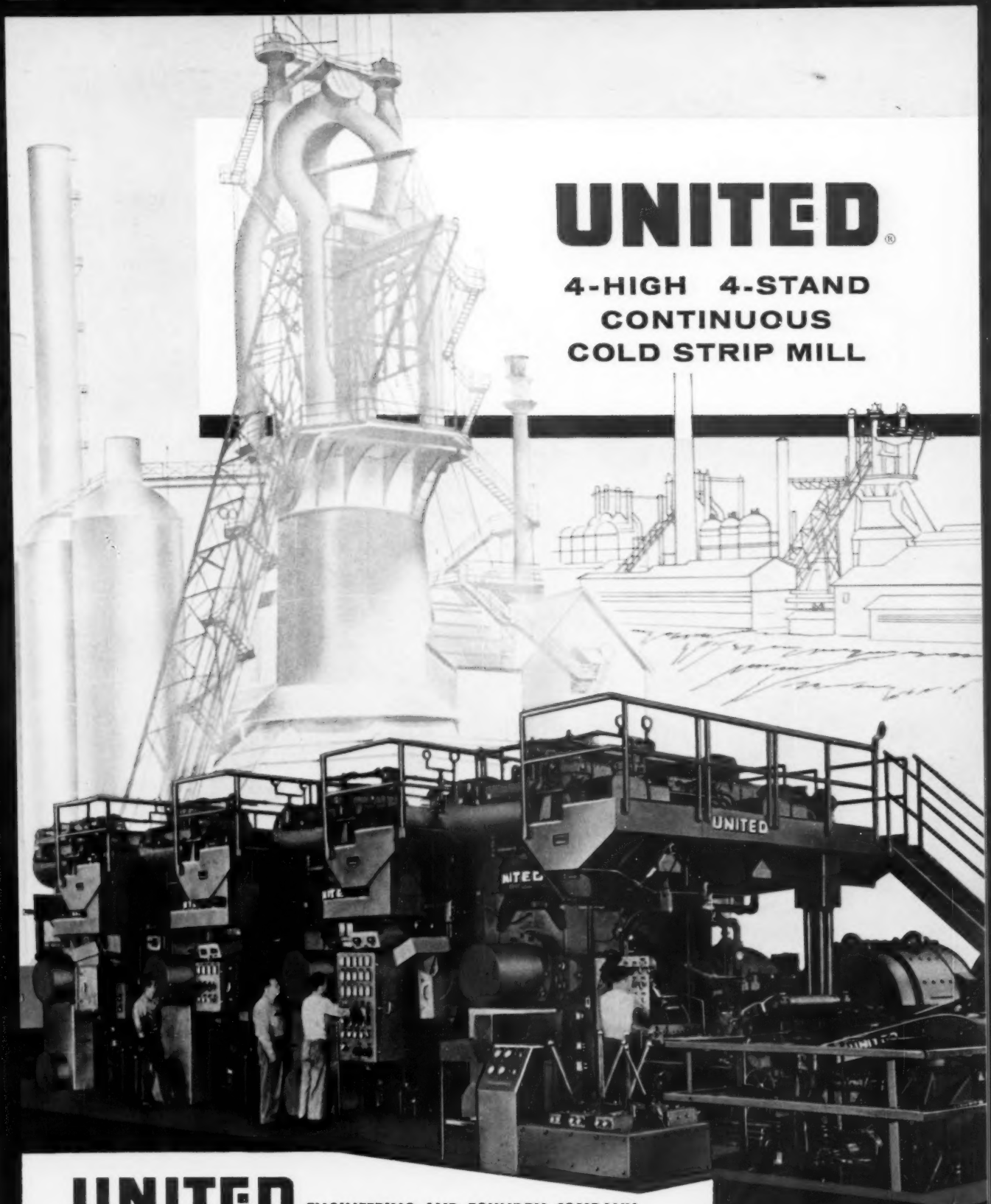

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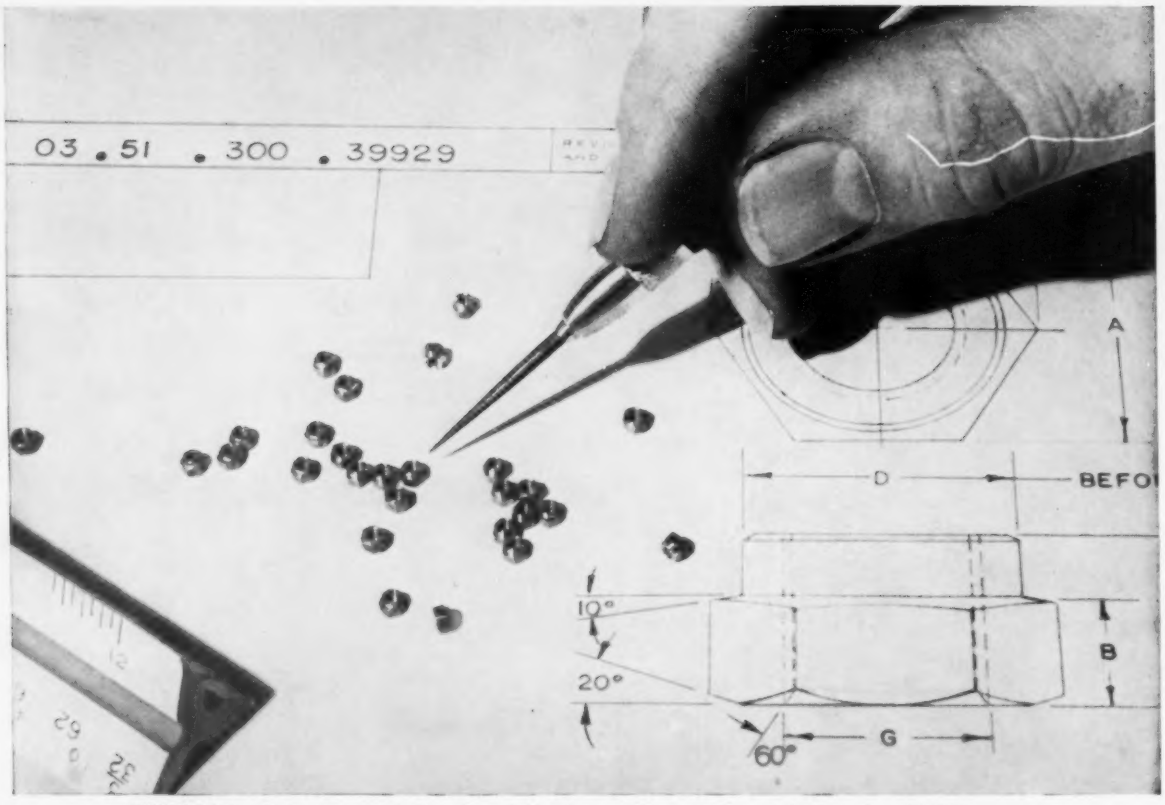

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1-64 NC-3B	.127	.123	.0635	.0585	.141	.090
1-72 NF-3B	.127	.123	.0635	.0585	.141	.090
2-56 NC-3B	.158	.153	.068	.063	.176	.105
2-64 NF-3B	.158	.153	.068	.063	.176	.105
3-48 NC-3B	.190	.183	.071	.066	.210	.120
3-56 NF-3B	.190	.183	.071	.066	.210	.120
4-40 NC-3B	.190	.183	.072	.067	.210	.120
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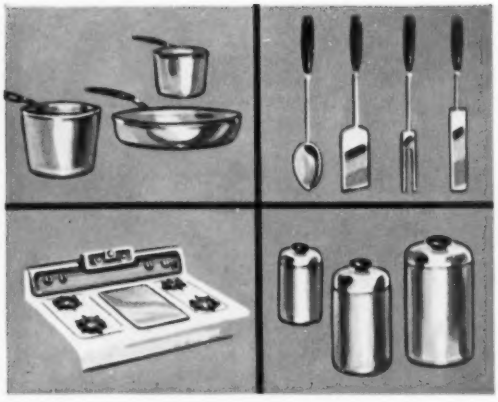

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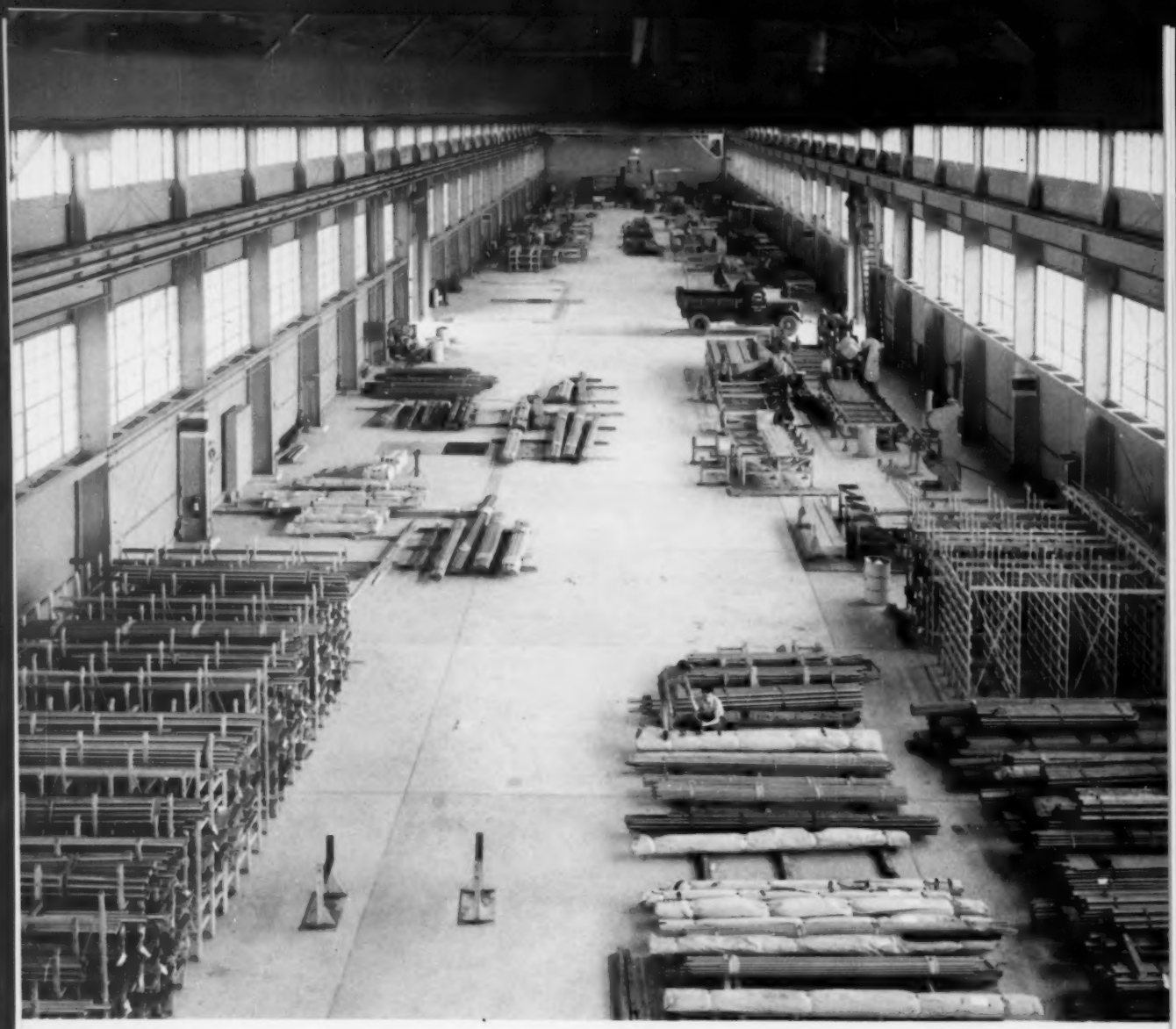

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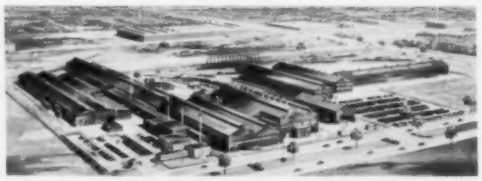

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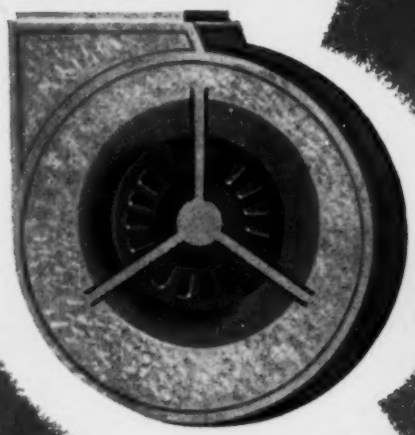

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WEIRTON STEEL COMPANY

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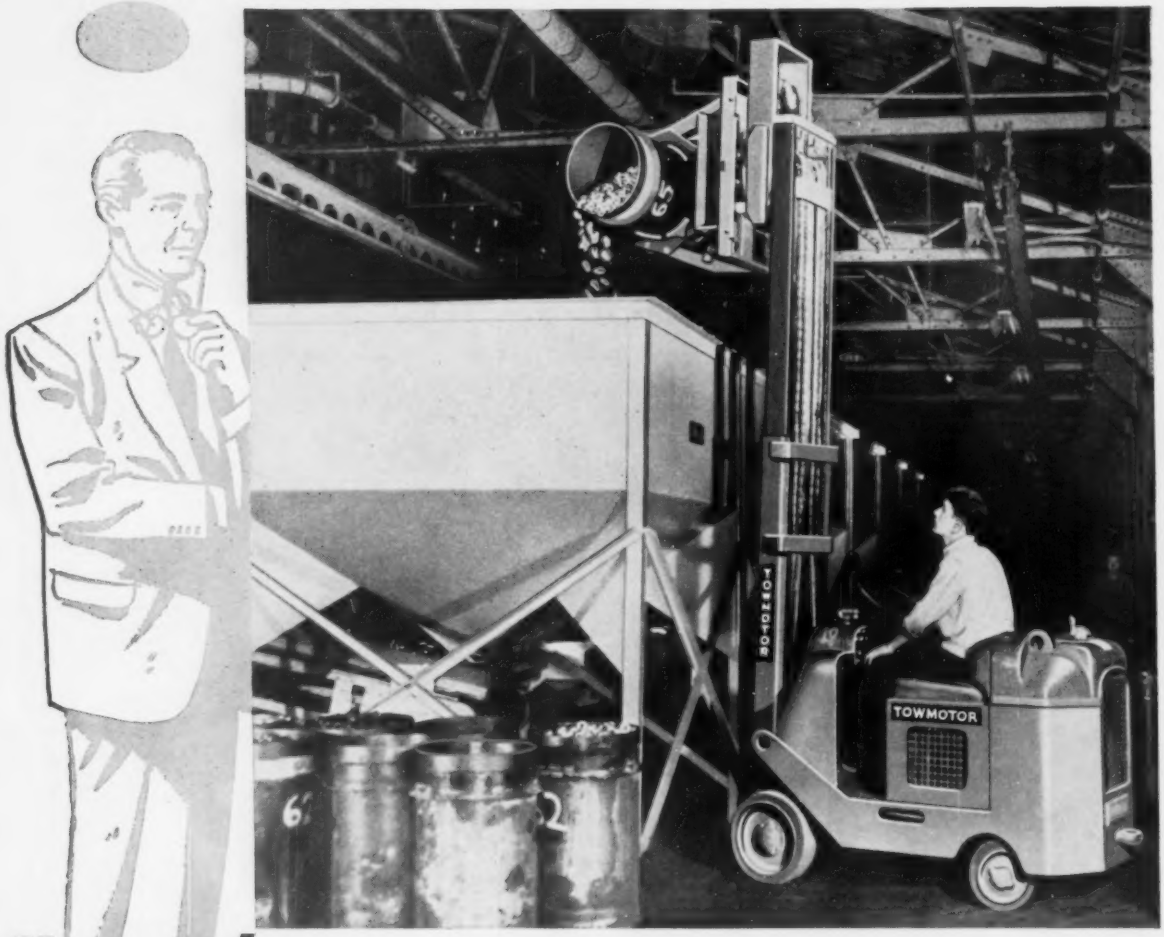


You can!

Typical savings produced by Towmotor Fork Lift Trucks are revealed in recent Certified Job Studies which show that: For one company, one Towmotor Fork Lift Truck paid for itself in 10 months. For another company, six Towmotor units saved $50,000 in a single year.

It's an amazing fact that most companies now using outdated materials handling methods are, through hidden costs, already paying the price of Towmotor equipment. To discover how you can save money on your materials handling, call your Towmotor representative today! . . . or write for Certified Job Studies covering your industry. TOWMOTOR CORPORATION, Div. 1502, 1226 E. 152nd St., Cleveland 10, Ohio.

Read how a Manufacturer of metal castings cut over-all handling costs 60%. Ask for Job Study #108

THERE'S ONLY ONE FORK LIFT TRUCK CALLED TOWMOTOR

America's ***best engineered*** *fork lift truck*

TOWMOTOR
THE ONE-MAN-GANG ®

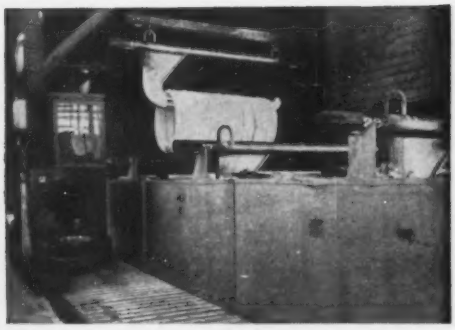
See the TOWMOTOR EXHIBIT mhi Cleveland Auditorium - June 5-8

NO PICKLING PROBLEM Too Large or Too Small

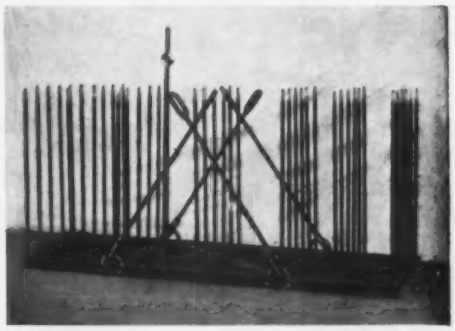
WELDCO Specialists Handle Them All!

IN HUNDREDS OF PLANTS, you'll find Weldco equipment all along the pickling line. For Weldco products are made of corrosion-resisting, hot rolled metals, that withstand attack from hot acids and other pickling solutions. They are strong yet light-weight, wear-resistant, durable, and long-lasting. You get all these advantages when you specify Weldco hooks, mechanical picklers, crates, baskets, racks, chain, steam jets, and accessories.

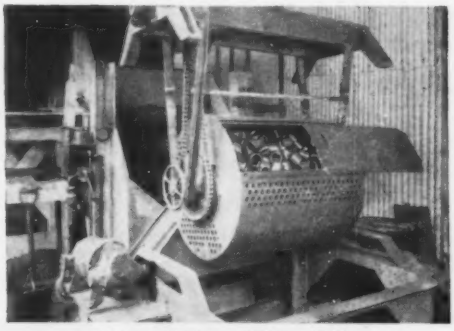
Weldco offers a complete, well-designed line of pickling equipment . . . plus the services of our experienced staff. Let Weldco engineers take care of all your pickling needs. For any problem, large or small, they have the practical, cost-cutting answer.



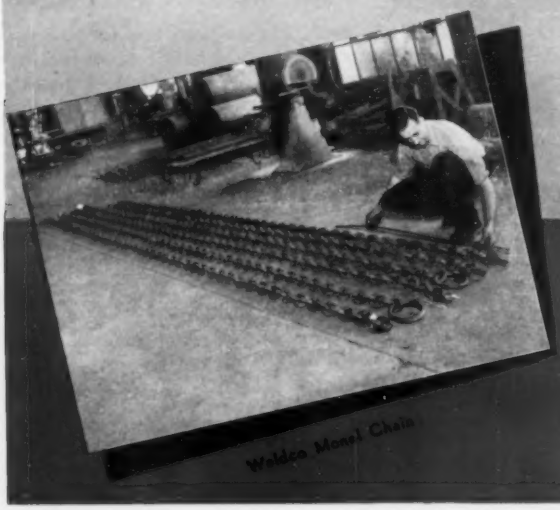
Weldco Pickling Hooks



Weldco Sheet Pickling Crate



Weldco Mechanical Drum Pickler



Weldco Monel Chain

THE YOUNGSTOWN WELDING & ENGINEERING COMPANY

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MORE THAN 300 LEADING MANUFACTURERS

are already putting

SKF TYPE "C" BEARINGS

in their products

Here are the trade marks of a few of more than 300 leading manufacturers — companies who want extra bearing performance — who already are using the *improved* SKF Type "C" Spherical Roller Bearing announced less than a year ago.

There are two reasons why

First: They know that for over 40 years, SKF has been *first* with anti-friction developments that *work*.

Second: They obtain, size for size, up to 50% more capacity, 2 to 3½ times increased life with SKF's Type "C" Spherical than they can obtain with any other available design, and at no increase in cost.

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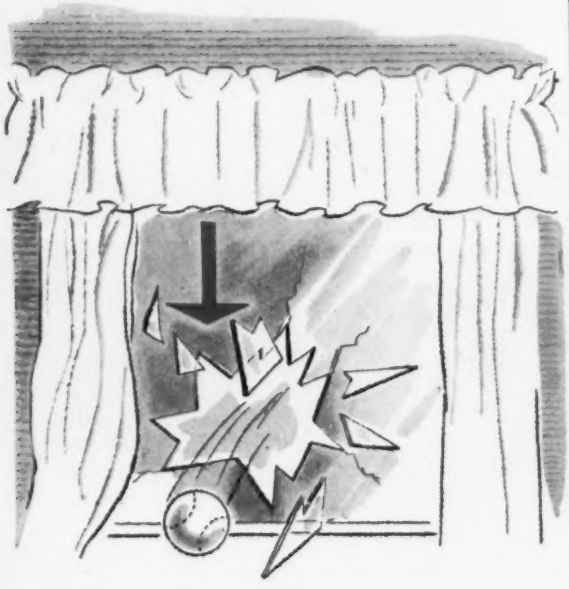
BALL AND ROLLER BEARINGS



a hole here means work...

a hole here saves work

Crucible Hollow Tool Steel Bars take much of the work out of making ring-shaped steel parts, or tools with a center hole. The hole's already there. You save expensive drilling, boring, cutting-off and rough-facing operations . . . you reduce machine time and scrap losses.

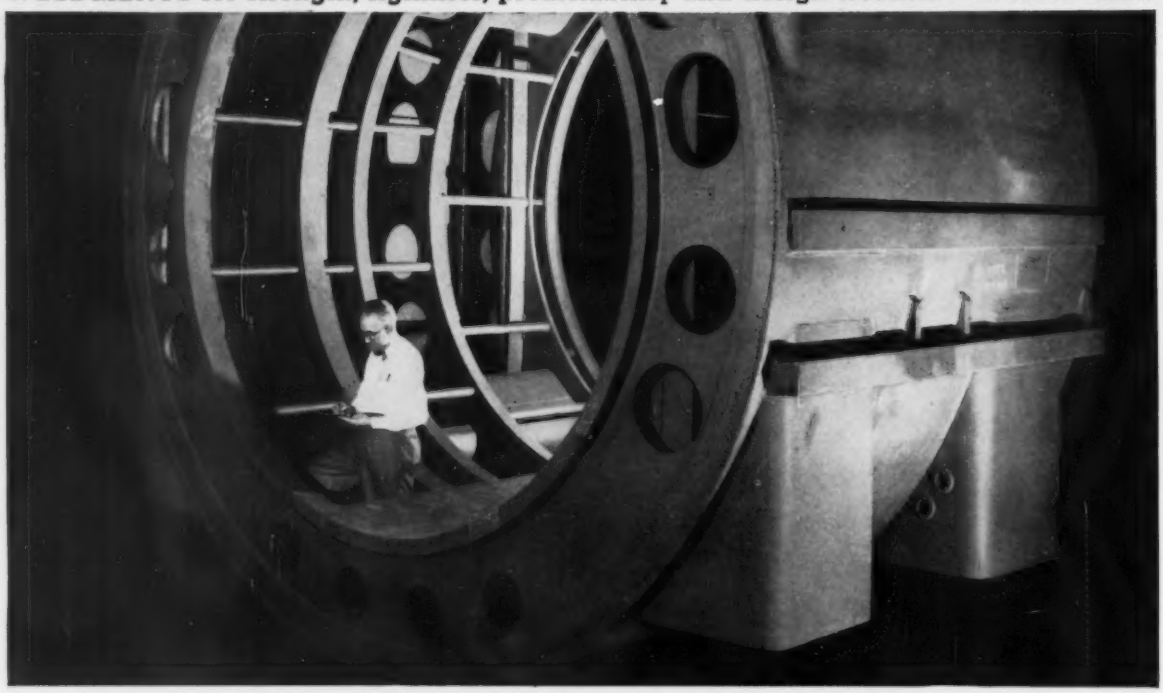
You can now get Crucible Hollow Tool Steel Bars in any of the famous Crucible tool steel grades, in virtually any I.D. and O.D. combination. And you can get *immediate delivery* from stock of the five most useful grades — KETOS oil-hardening . . . SANDERSON water-hardening . . . AIRDI 150 high-carbon, high-chromium . . . AIRKOOL air-hardening . . . NU DIE V hot-work tool steels.

Your Crucible representative can quickly show you how Crucible Hollow Tool Steel Bars will save you work and money. *Crucible Steel Company of America, The Oliver Building, Mellon Square, Pittsburgh 22, Pa.*

CRUCIBLE first name in special purpose steels

Crucible Steel Company of America

WELDMENTS for strength, lightness, predictability and design freedom—at lower cost!



ELECTRICAL GENERATOR FRAME: End section of a three-piece stator frame built by Lukenweld for General Electric. This type of welded structure provides remarkable rigidity and strength at critical points with a minimum of weight.

LUKENWELD QUALITY WELDMENTS OFFER YOU A UNIQUE COMBINATION OF ADVANTAGES

Lukenweld welcomes orders for the really big and challenging weldments. The most extensive facilities and longest experience of any commercial weldery in the country combine to save you money and time. Here's how...

DEPENDABILITY The predictability and rigidity of welded structures plus Lukenweld's specialized knowledge of design and materials selection assures equipment that will perform efficiently, longer.

RELIABLE SOURCE OF MATERIALS Carbon, alloy and clad steel plates in the widest range of types and sizes available anywhere are obtainable "right next door"—from the Lukens rolling mills.

CONSULTATION SERVICE Metallurgical, design engineering, related services are available on your job.

FINISHING FACILITIES Modern heat treating, machining and other finishing facilities are your assurance of complete quality control from steel plate to finished weldment—ready for assembly in your equipment.

EXPERIENCE Lukenweld, the first commercial weldery in the U.S., pioneered many advances in welded construction. Knowledge and craftsmanship gained through this experience make Lukenweld unusually qualified to meet your weldment needs.

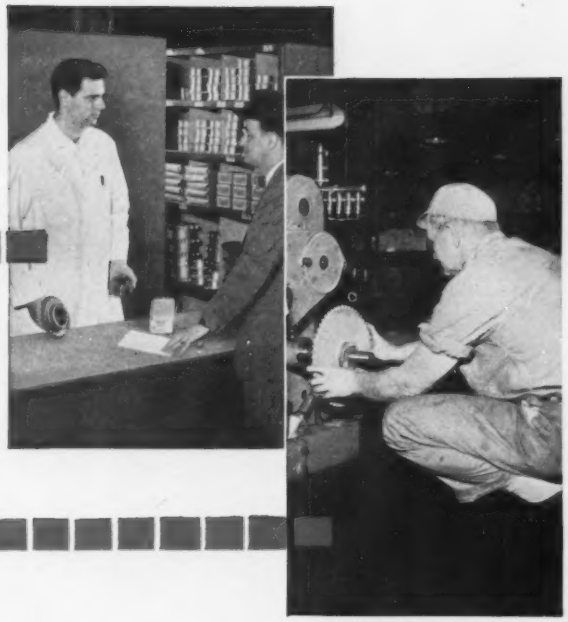
FOR INFORMATION on how Lukenweld can answer your particular weldment problems or for a copy of the informative booklet, "Weldments by Lukenweld," write on your company letterhead to Manager, Marketing Service, 818 Lukens Building, Coatesville, Pa.

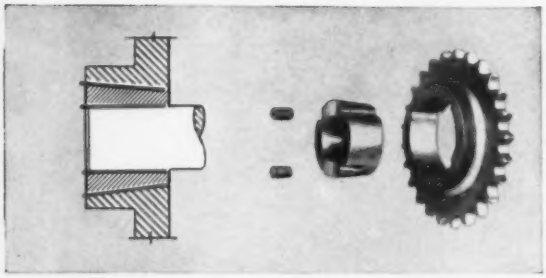
LUKENWELD LUKENS

A DIVISION OF LUKENS STEEL COMPANY
COATESVILLE, PENNSYLVANIA

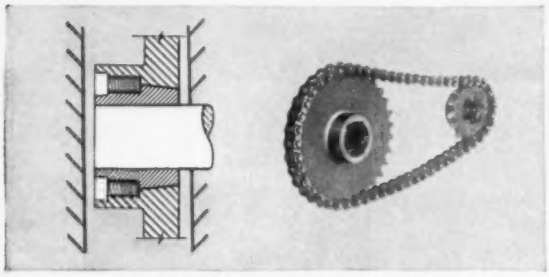
ORDERED today

OPERATING today

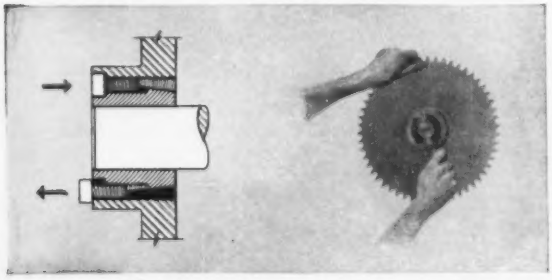




FULL BEARING . . . POSITIVE GRIP. Contact extends the entire length between bushing and shaft, sprocket and bushing. Uniform compression on shaft provided by tapered construction.



SAFE AND COMPACT. Flush mounting requires minimum shaft space and bushing requires no more length than sprocket hub. No projecting flanges or bolts—all cap screws are fully recessed.



EASY TO INSTALL AND REMOVE. Setscrews force and hold bushing in tapered bore of sprocket, clamp it tightly onto shaft. Turning setscrew in removal hole quickly releases bushing.

LINK-BELT roller chain taper lock sprockets require no reboring or other machining

HERE'S the simplest, most economical method of installing roller chain sprockets. Link-Belt roller chain taper lock sprockets are available for immediate delivery in every industrial area, in sizes from ½ to 2-in. pitch. Bushings are stocked in bore increments of 1/16 in. for shaft sizes from ½ to 4-in. diameters. No delay for sprockets to be rebored.

Teeth are precision cut in conformance with ASA standards, accurately spaced for smooth chain action. Uniform, true tooth surfaces provide full contact with chain rollers, assuring maximum operating life.

Your source is the Link-Belt factory branch store or authorized stock-carrying distributor. Be sure to ask for new Book 2649 listing all available stock sizes.

LINK-BELT

13,947

ROLLER CHAIN AND SPROCKETS

LINK-BELT COMPANY: Executive Offices, 307 N. Michigan Ave., Chicago 1. To Serve Industry There Are Link-Belt Plants, Sales Offices, Stock Carrying Factory Branch Stores and Distributors in All Principal Cities. Export Office: New York 7; Canada, Scarboro (Toronto 13); Australia, Marrickville, N.S.W.; South Africa, Springs. Representatives Throughout the World.

NEW! Heavy-duty relay in small space

This new CLARK Type "PM" Control Relay introduces a new concept in relay design: *Sectional Pole Construction.*

In this new relay, each pole is contained in its own melamine housing, and any individual pole can be removed or replaced from the front without disturbing the others. A short circuit is confined to a single pole and will not destroy the whole relay. Wiring terminals are on the front, and all maintenance including coil changing, pole or magnet replacement, is also from the front—without removing relay from panel. Contacts are quickly and easily convertible from normally open to normally closed and vice versa—from the front. Range of models provides relays with 2 to 12 poles. Exclusive design allows more contacts per square foot of panel space. In addition to the many advantages of SECTIONAL POLE CONSTRUCTION, you get a *heavy-duty relay in small space.*

For complete information write to

The CLARK CONTROLLER *Company*

Engineered Electrical Control

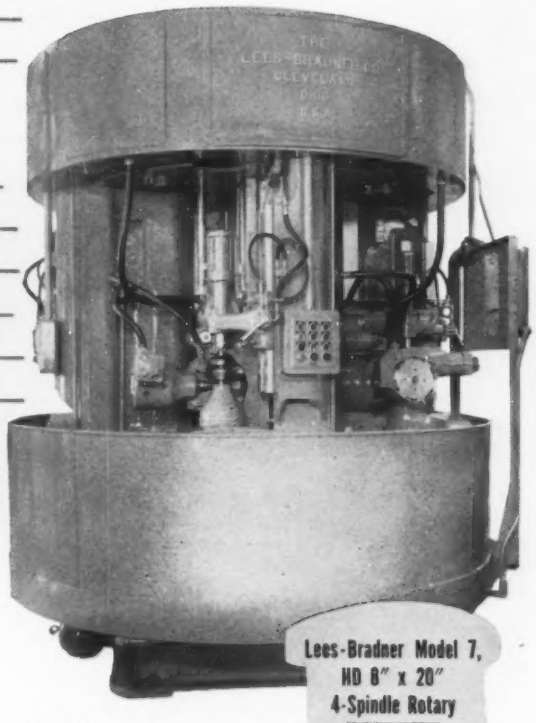
1146 East 152nd Street • • Cleveland 10, Ohio

IN CANADA . . . CANADIAN CONTROLLERS, LIMITED • MAIN OFFICES AND PLANT, TORONTO

LEES-BRADNER

Sets the HOBBING pace for tomorrow

with 4 machines in 1



Lees-Bradner Model 7, HD 8" x 20" 4-Spindle Rotary Hobber. Also available in single and 6-spindle models.

Here's a complete hobbing production line in one space-saving unit.

Actually the Lees-Bradner Model 7, H D 4-Spindle Hobber is four separate and independently operative machines in one. Each hobbing unit incorporates basically the same automatic, high-production features as the remarkable 7 HD Single Spindle Hobber. This includes a heavier, more rugged headstock, heavy-duty column and a 10 H. P. motor.

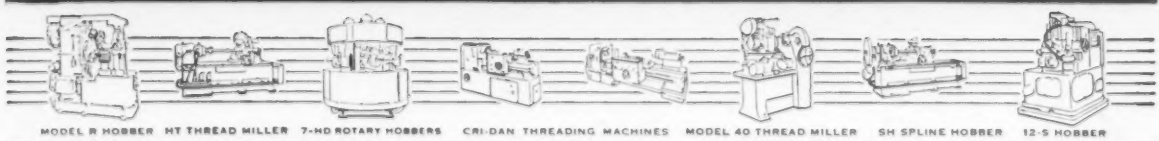
This amazingly efficient machine not only saves valuable floor space but, with its pushbutton controls and automatic features, actually controls the operator thus reducing the chance for human error or slowdown. Chips and coolant are easily carried away from the headstock by the elimination of flat surfaces.

So, if your manufacturing space is valuable and high unit production important, ask your Lees-Bradner representative to give you the story on the ultra-efficient 4-spindle rotary hobber. Write or wire us direct for his name and address in your area.

View of new HD headstock with increased bearing surface between column and headstock, heavier casting, coolant and chip carry-away.

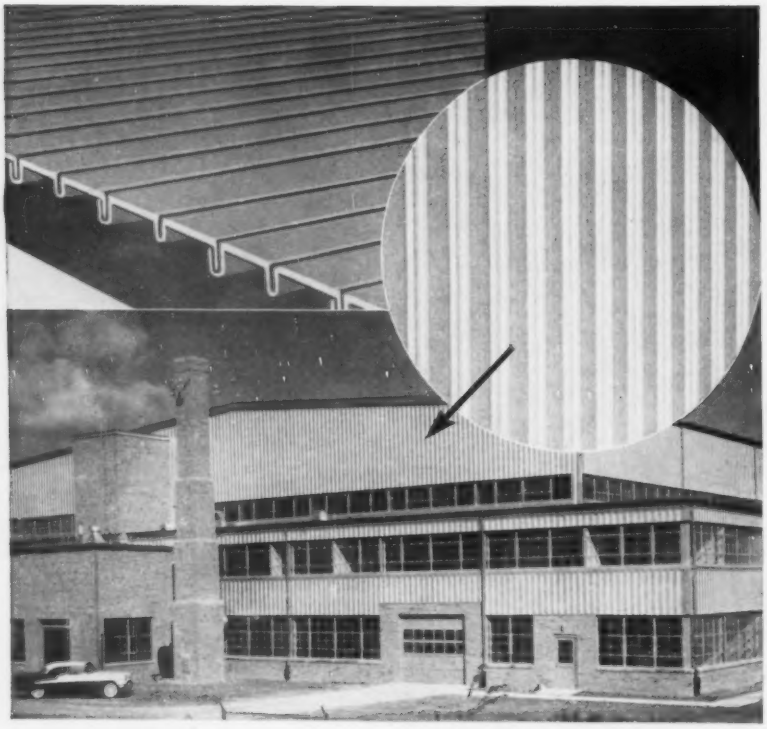
the LEES-BRADNER Company

CLEVELAND 11, OHIO, U. S. A.



MODEL R HOBBER · HT THREAD MILLER · 7-HD ROTARY HOBBERS · CRI-DAN THREADING MACHINES · MODEL 40 THREAD MILLER · SH SPLINE HOBBER · 12-S HOBBER

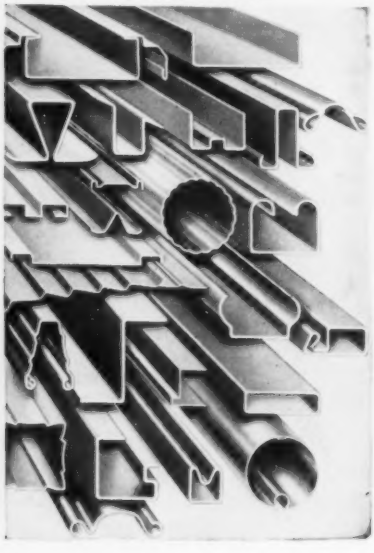
IF YOU THREAD OR HOB . . . GET A BETTER JOB WITH A LEES-BRADNER



(TOP) *Cross-section of cold-roll-formed Roof Deck by Walker Supply & Mfg. Co., Ecorse, Michigan.*

(INSET CIRCLE) *Aluminum siding panels, (made by Walker Supply & Mfg. Co.) give fine architectural effect.*

Elevator Door, Casing and Trim, by Dahlstrom Metallic Door Co., Jamestown, N. Y.



1001 things being done by COLD ROLL FORMING

The Cold-Roll Forming Machine is a powerful weapon in the hands of mass-production metal-working industries striving to fight inflationary forces with technological advances.

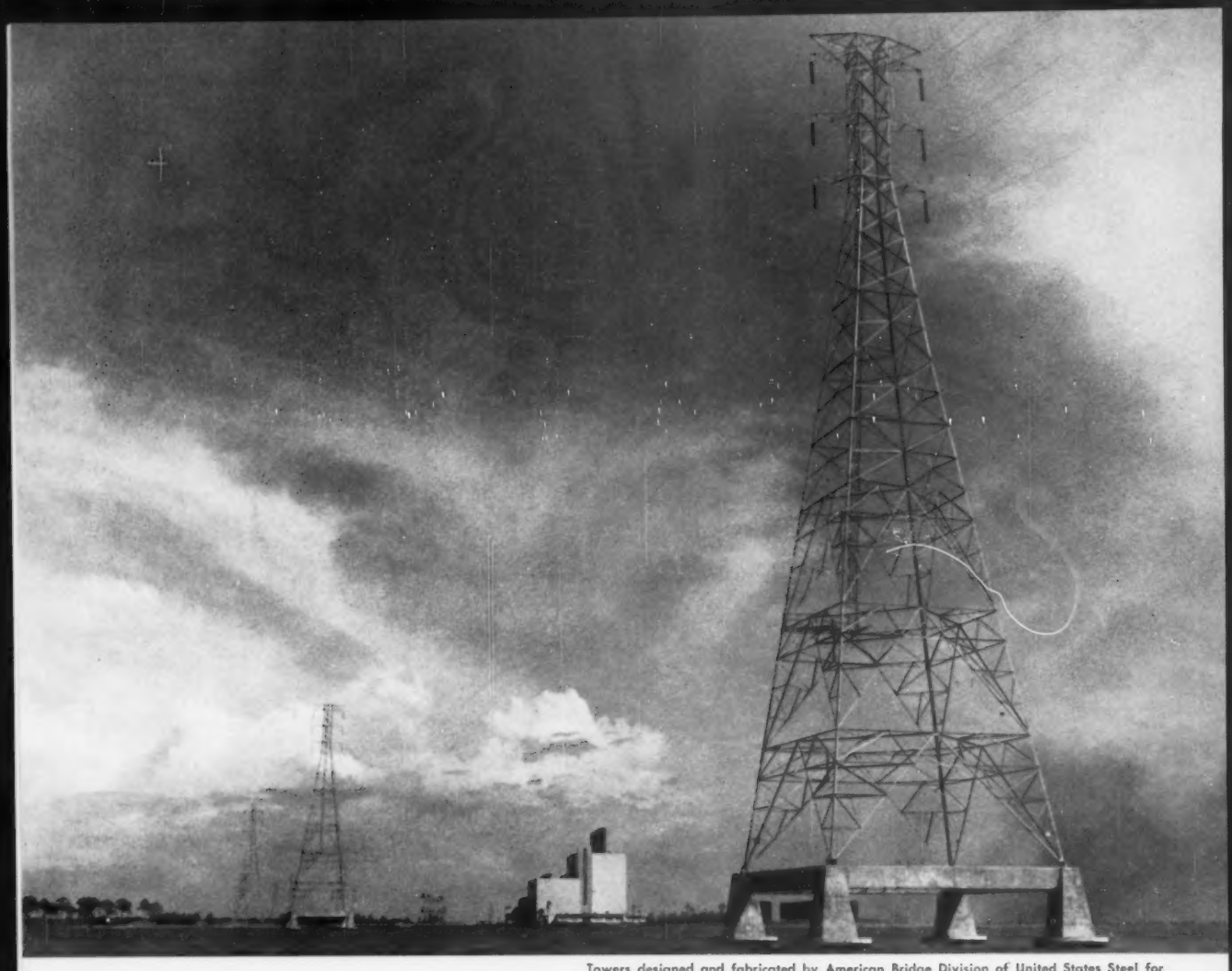
This applies even to the building industry, long considered immune to mass-production methods. The field abounds in opportunities for cost reduction through cold-roll forming of components for quick and easy assembly and erection on the job. The list includes, for example, specially designed wall, partition, floor and roof systems, nailable studs and joists, cabinets, closets, windows, doors and trim. It even includes exterior coverings, for architectural beauty as well as insulation and weather protection (see photo above).

The Yoder Book on Cold-Roll Forming contains numerous illustrations with information on the economic and mechanical possibilities of cold-roll forming, the machines and the tooling. Yoder has long been looked up to as the leader in designing and building all such equipment. A copy of the book is yours for the asking.

THE YODER COMPANY • 5510 Walworth Avenue, Cleveland 2, Ohio

ENGINEERING YODER MANUFACTURING

COLD ROLL FORMING MACHINES
ROTARY SLITTING LINES
PIPE AND TUBE MILLS—Electric Weld



Towers designed and fabricated by American Bridge Division of United States Steel for Florida Power Corporation. Erected by Southeastern Utilities Service Company, Miami, Fla.

26 tons of weight saved by USS MAN-TEN Steel saves $7,200 in erection costs

Because power transmission towers are frequently installed in locations far removed from regular means of transportation, every pound saved reduces shipment and erection costs.

The four towers crossing Old Tampa Bay from the Florida Power Corporation's Higgins plant forcibly illustrate this fact. These towers, built 198 ft. high to provide a 100 ft. clearance over mean low water, had to be designed to resist hurricane force winds of 135 mph, with an overload capacity factor of 1.25.

The high strength required was readily obtained by using USS MAN-TEN Steel rather than plain carbon steel in the tower legs. At the same time, because of MAN-TEN's high yield point of 50,000 psi, it was possible to reduce weight of legs by 26 tons. This considerable saving in steel tonnage reduced the cost of the towers even though USS MAN-TEN Steel costs a little more.

The big saving, however, was in cost of erection.

There were two different rates involved; one for erection over water and one for erection on land. 6½ tons were trimmed from each of the three towers erected over water, resulting in a $6,000 saving. The tower erected on land weighed 6 tons less, providing an additional $1,200 saving—or a total erection cost saving of $7,200.

If you are looking for construction that will save money for you by reducing weight, prolonging life and minimizing maintenance—at little or no increase in first cost—find out more about USS High Strength Steels—USS MAN-TEN, USS COR-TEN and USS TRI-TEN. You'll find our 174-page "Design Manual for High Strength Steels" extremely useful in applying these steels. For free copy write—on your company letterhead—to United States Steel Corp., Room 5222, 525 William Penn Place, Pittsburgh 30, Pa.

UNITED STATES STEEL CORPORATION, PITTSBURGH · AMERICAN STEEL & WIRE DIVISION, CLEVELAND · COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO
NATIONAL TUBE DIVISION, PITTSBURGH · TENNESSEE COAL & IRON DIVISION, FAIRFIELD, ALA. · UNITED STATES STEEL SUPPLY DIVISION, WAREHOUSE DISTRIBUTORS
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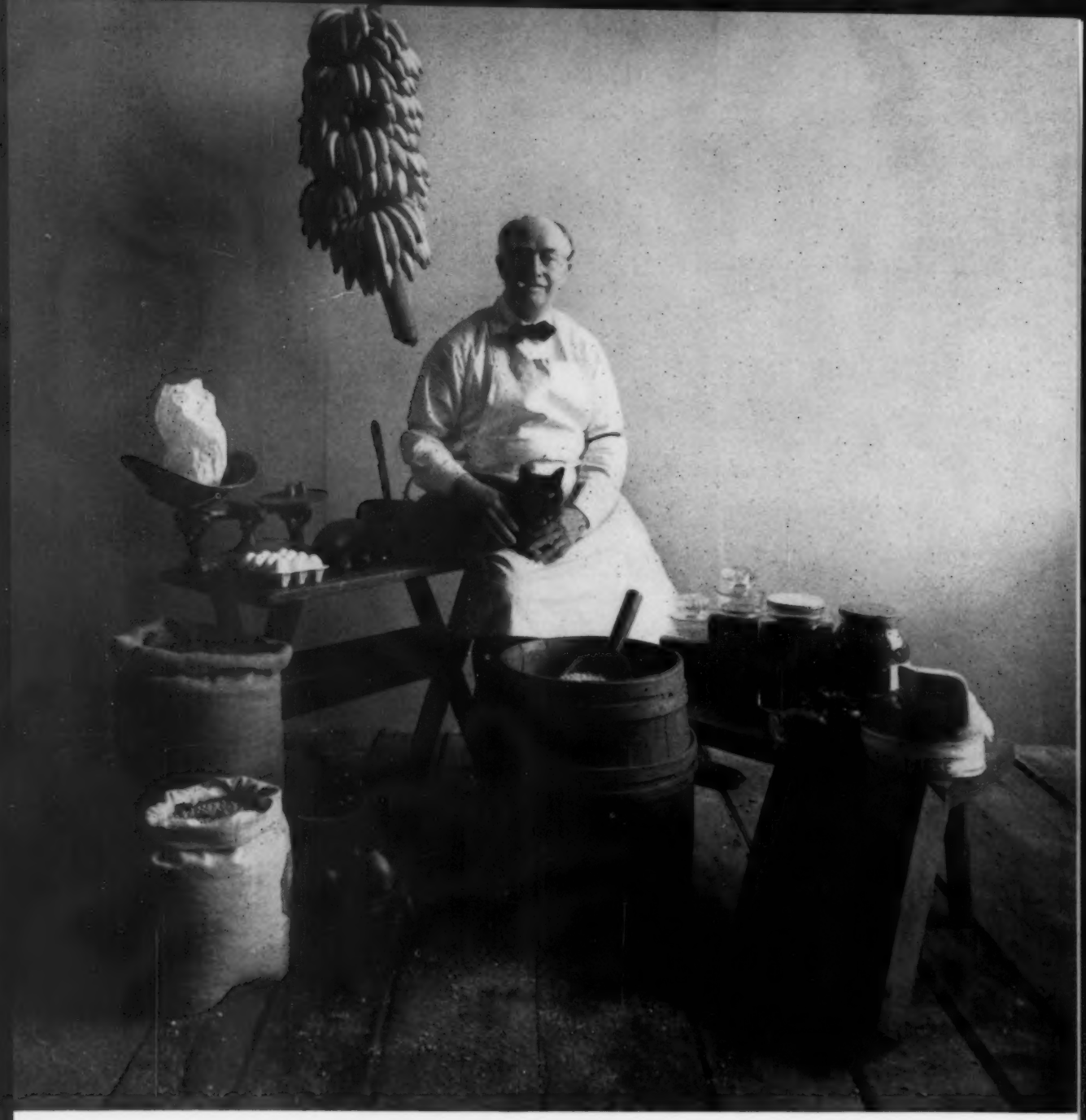
USS HIGH STRENGTH STEELS

USS MAN-TEN · USS COR-TEN · USS TRI-TEN

6-672

UNITED STATES STEEL



WHO TOOK THE CAT OUT OF THE GROCERY BUSINESS?

You don't have to be as old as the hills to remember when practically everything you lugged home from the grocery store came out of a sack, a crate or a barrel. The revolution in food packaging has taken place within recent years. Can-makers and food processors have placed on our tables an infinite variety of basic foodstuffs and exotic delicacies. Steel has shared in this progress. At Inland, we've been working closely with can and container manufacturers for many years, helping to make steel an increasingly versatile and useful packaging material.

INLAND STEEL COMPANY *38 South Dearborn Street, Chicago 3, Illinois*
Sales Offices: Chicago, Milwaukee, St. Paul, Davenport, St. Louis, Kansas City, Indianapolis, Detroit, New York. Steel products supplied to the steel container industry include tin plate, black plate, hot and cold rolled sheets and strip. Other products: plates, structurals, Ti-Co galvanized sheets, 4-Way safety plate, bars, reinforcing bars, rails and track accessories, coal chemicals.

NEWSFRONT

Switch To LPG Cuts Trucking Costs

Industrial truck users who have converted from gasoline to liquid propane gas as a fuel are quite enthusiastic about the savings in both operating and maintenance costs. Field conversion has been made on about 1500 trucks thus far, and truck producers estimate that LPG units will go on 5 pct of this year's output. By 1960, it is expected to triple.

Steam Treatment Increases Cutter Life

A steam oxidizing heat treatment of milling cutters at 1025°F has boosted their life by 1000 pct. The application involves cutting a 0.250-in. keyway slot within 0.001 in. tolerance in a part from 4140 bar stock having hardness of 34 to 38 Rc. At first, cutters produced only four pieces. Chrome-plating the cutters upped this to 11 pieces, use of carbide cutters increased it to 11 to 14 pieces. Steam-treated cutters now produce 100 to 125 pieces.

Shed Light On Machinability

Some clearing is noted in the cloud that has shrouded the subject of machinability. As measurements go, such venerable standards as tool life and metal hardness are still in vogue. But evaluations of microstructure and metal hardness alone are now considered too limited to accurately predict machining performance. Measurements of tensile strength, elongation, and even impact toughness are now "essentials" for the well-rounded test of machinability.

Coal Pile Getting Low

Against the current rate of bituminous coal consumption for this year, stockpiles are at the lowest level since the close of the strife-torn year of 1949. Coal customers have about a 47-day supply on hand. This is nearly 22 pct less than the 60-day supply above ground at the start of 1955—considered the prudent minimum. U. S. consumption at the end of '55 showed a 28-pct gain over the previous year.

Weight-Saving Steel Makes Hit

Consumer acceptance of the new T-1 heat-treated alloy steel has far exceeded expectations and producers are having a tough time meeting deliveries. One reason is the unusual demand from fabricators of big bridges, power shovels, etc., where big saving in weight pays off. Don't look for easier supply until fall, when new processing equipment will be installed.

New Feed Boosts Press Output

A new type automatic press feed system is boosting production of formed parts more than 40 pct, at the same time increasing safety to personnel. It can operate continuously with no downtime for removal of finished parts or positioning of preforms. Maximum production with the new feed is 700 pieces per hour but could hit 1200 with an ideal application. The unit can also convert an open side press into a transfer type if an arrangement is made for rear discharge.

Demand For Handling Equipment Grows

Makers of material handling equipment report 21 pct more bookings for 1955 than for 1954 in spite of decreased government purchases. Bookings for industry represented more than a 35-pct increase. Equipment builders are forecasting a 10-pct increase for '56 over '55, basing their prediction on industrial expansion, higher production and anticipated labor shortage.

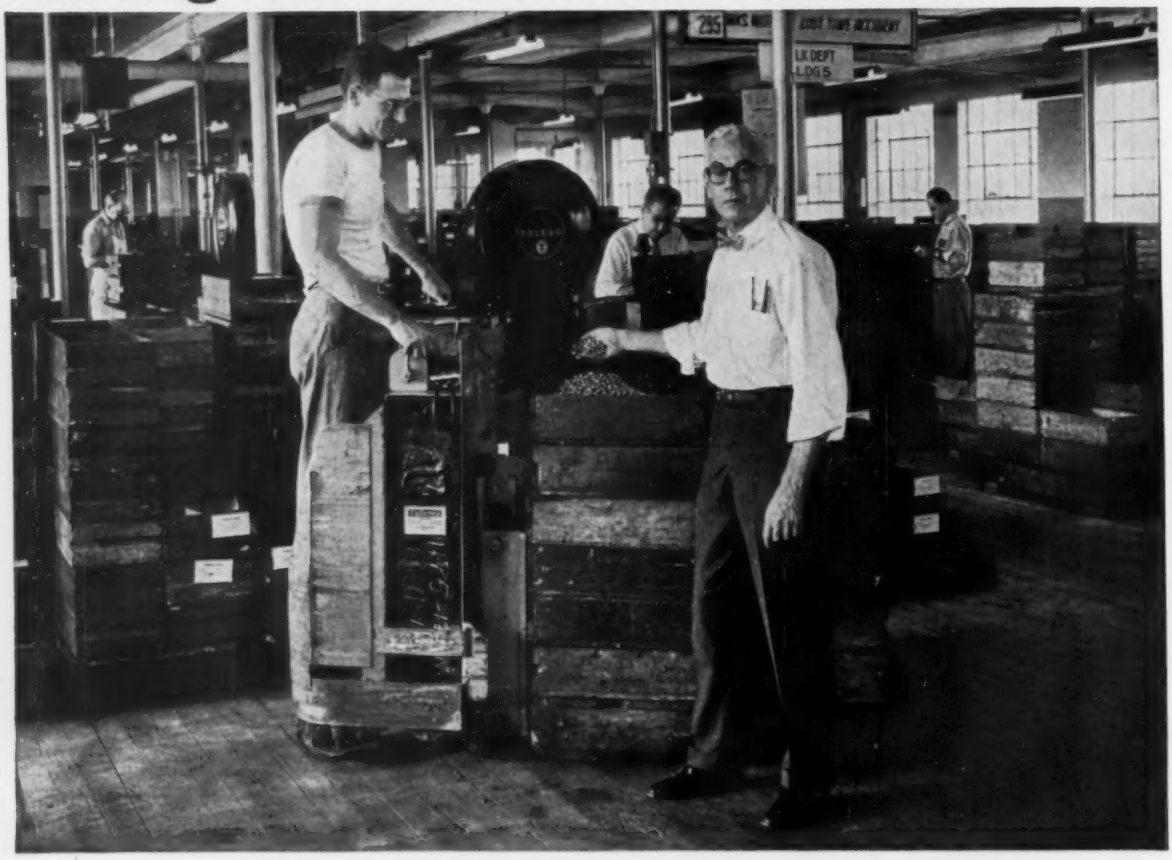
Are You A Retired Metals Expert?

If so, the Interior Department's Office of Minerals Mobilization is looking for you. Qualifications are that you have industrial knowledge of metals production, supply and demand factors, and tariff and mobilization needs. At least partly, because of recent attacks on businessmen in government, the Department says "men active in corporations today are very fearful of coming into government work," even on advisory committees.

Need More Draw Press Flexibility?

Hydraulic draw press users needing more than three-speed flexibility can now obtain a finger-tip control system giving six or more speed changes. Full-range adjustment of blank holder and draw platen speeds from zero to maximum during an increment of their stroke (up or down) is possible, permitting, for example, slow stripping, fast upstroke.

The Engineer from Continental Screw Co. ...



...offers you the world's largest selection of stainless steel fasteners

Continental can guarantee faster service because of its tremendous inventory

No matter what your stainless steel fastener needs may be, Continental is in a position to serve you—thanks to the world's largest inventory of stainless steel fasteners.

All types of fasteners are represented in our inventory—wood screws, tapping screws, machine screws . . . in slotted or Phillips heads. And Continental has a full selection of stainless steel nuts . . . with close thread limits up to 3B.

This large inventory is the key to Continental's reputation for fast, accurate service. Literally acres of fasteners are waiting for your call. And Continental's specially trained engineers are always ready to analyze your specific needs. Take advantage of Continental's more than 50 years' experience. Call today.

Only Continental Engineers Are Required To Have This Training

Each engineer at Continental is required to undergo thorough experience producing ground thread taps and gages, with their exacting screw thread dimensions. This special training is passed on to you—at no extra cost.

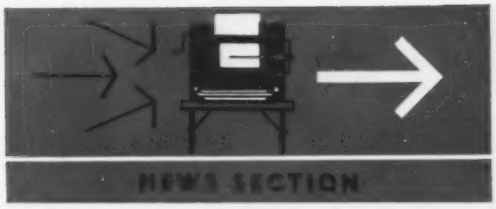
CONTINENTAL SCREW COMPANY INC. 1904

You Can Always Count on Continental

Continental Screw Co.

Manufacturers of Holtite Fastenings

New Bedford, Massachusetts, U.S.A.



NICKEL: Will Shortages Ever Ease?

Record production expected in '56 . . . However, consumption demands will also hit new high . . . Government buying will continue to unbalance the market . . . Long range outlook brighter—*By F. J. Starin.*

◆ SHORTAGE CLOUDS over the nickel-consuming industries are starting to clear. But the storm isn't over yet and won't be for some time—certainly not in 1956.

Dept. of Commerce estimates total requirements of all U. S. industry in 1956, including defense contractors, at about 300 million lb. This would be a record.

On the other hand, J. F. Thompson, chairman of International Nickel Co. of Canada, estimates total free world output at about 442 million lb. This also would be a new high.

Normally this country can count on about two-thirds of the world output. If production estimates hold up, that will mean 295 million lb, just slightly under the expected demand.

However, part of the metal earmarked for this country will go straight into the stockpile. In 1955, 24 million lb were diverted to industry from stockpile delivery. A like amount can be expected in 1956. But this merely reduces the government's slice of the pie and still subtracts from imports available to industry. Some sources, in the nickel and electroplating industry, estimate this slice to be as much as 90 million lb per year.

Defense Rosy

Government policy for procuring nickel for the stockpile is to spread buying over a period of years and gradually taper off when the quota is almost realized. Thus, it will probably be 1957 at least before ODM buying will begin to slack off.

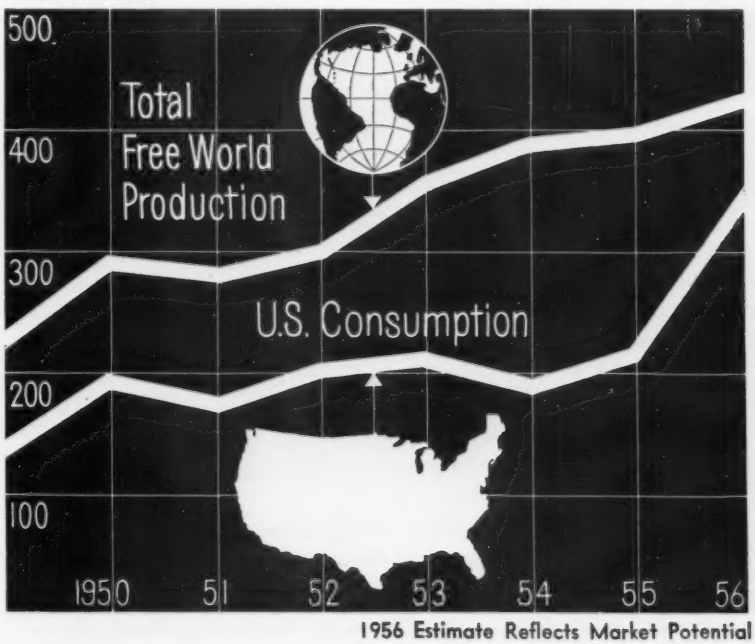
Short-range outlook is rosiest for defense contractors. Under current allocation arrangements, they have first call on all nickel whether released from stockpile deliveries or placed directly on the market.

Defense demand took a sharp upward turn in 1955. A continuation of the upcurve is expected in 1956. This will tend to make the circumstances of non-defense industries more critical. The bright spot is the immediate promise of record nickel production, long-range expectations of reduced government buying and the ODM action to squeeze out gray market operators.

There seems to be some difference of opinion between the government and industry on the question of the gray market. Jobber electroplaters claim to be the hardest hit. They insist that most of the nickel available to them is at a premium of 3 or 4 times the producer price.

The BDSA says that any overpriced nickel on the market stems from Japanese and European sources. These areas account for

Why Nickel Stays Tight



1956 Estimate Reflects Market Potential

a total of 5 pct of world production.

Things may get worse before they get better. Industry nickel inventories which picked up immediately after the Korean War are again on a serious downgrade. Stocks on hand at consumer plants are about 15 million lb.

Stainless steel producers are just as worried as electroplaters on a short-range outlook. In 1955 the stainless industry accounted for 25 pct of nickel purchased—about 53 million lb. Total nickel requested for non-defense stainless production and required for defense contracts in 1956 is about 100 million lb—almost double. This does not imply stainless production will also double. The producers began 1955 with substantial inventories of nickel and nickel scrap. In the course of setting a shipment record in 1955 both were exhausted.

Producers have been attempting to take the sting out of the tight market situation by promoting steel with only 4 pct nickel. However, they have been running into a certain amount of resistance and thus far the idea has not really gotten off the ground. The stainless producers will continue their efforts in this direction. They expect better results in 1956.

Low Alloy Confused

Long-range outlook for stainless steel producers is considered good.

Use of nickel in low alloy steels is also headed up. Big item in this field is defense and military equipment. Priority eliminates any worry about getting metal for their uses. However, for non-defense production the outlook is scrambled. Most mills which turn out stainless steel also produce alloy steel. A single order covers nickel for both. Then each mill allocates what it was able to get depending on its own outlook.

With stainless having a record year in 1955, alloyed steels were not able to take advantage of the increased markets. This may continue to be a problem in 1956.

On a longer-range outlook a big problem seems to be the lack of activity in product development for non-defense uses. Industry doesn't want to tie up funds which might be used for expansion, in projects which would have to be pigeon-holed no matter how good, for lack of nickel.

Nonferrous industries expected military demand for nickel to drop in 1955. This did not happen and the industry is faced with a serious shortage. With defense contractors taking an unexpected increase, allocations leave less for non-defense uses. Customers finding it difficult to replace nickel parts began to seek substitutes. With defense demand expected to go higher in 1956, mills are faced with an even shorter supply and possible loss of non-defense customers.

Electrical Outlook

Product development programs and the increase in electrical power output in the U. S. have put a severe strain on inventories of nickel for electrical resistance and high temperature uses. The industry was not able to get the full benefit of the boom year in 1955 because of the lack of nickel. The situation in 1956 will be just as bad, with an increase in available nickel of only about 1.5 million lb.

However, the long-range future for electrical applications—after government buying has ceased—is perhaps the brightest of any major nickel-consuming industry in terms of growth potential. An advanced product development program is ready to take a big chunk of any surplus nickel which might be produced.

Little immediate relief can be expected from remelt and secondary metal. Nickel-bearing scrap will continue to be short during most of 1956.

Government Action

To insure that no single industry bears the brunt of the tight supply of nickel expected for all of 1956, the Business and Defense Services Administration will conduct a monthly audit of nickel distributed by producers. This is aimed at preventing duplication of orders on the same priority.

Long-range industry thinking reflects a reserved optimism. General consensus expects an adequate supply of nickel to be available when the U. S. stops buying. The Dept. of Commerce warns that the pendulum may swing further over than expected. It claims that industry will have to continue to use 300 million lb per year if it is to take up the slack.

Commerce Dept. Cracks Down

- **Business and Defense Services Administration is holding up the priority orders for nickel of "a little less than 50" firms pending investigation of whether the companies were using the military rated metal for civilian uses.**
- **BDSA threatens criminal action against any firm suspected of violations of the Defense Production Act. Cases will be turned over to the Justice Dept. Offenders are liable to $10,000 fine, year in prison, or both.**
- **BDSA is also requiring nickel suppliers to turn over all future rated orders from the unnamed firms involved for examination.**
- **The action stemmed from a recent survey which indicated that nickel obtained on defense priorities exceeded Defense Dept. needs.**

MARKETING

POWDER TOOLS: From Ping To Bang

Powder-actuated tool producers are gunning for $8.5 million sales peak this year . . . Industry looks for $40 million business by 1960 . . . Broader markets may include do-it-yourself field—By *D. G. Picinich.*

◆ TAKING ITS FIRST tottering steps toward maturity, the powder-actuated tool industry is proving it's a healthy infant.

This year, the 8-year-old youngster will be reaching for $8.5 million in sales, after hitting a $7 million peak in 1955. Within 5 years, it's conservatively estimated the industry will average around $40 million annually.

And, for the first time, major tool producers will be seriously going after new markets outside the construction field, namely the billion dollar mining and railroad industries.

Variety of Uses

Another big market potential is the multi-billion dollar maintenance business which, say industry spokesmen, is still wide open. Also, some manufacturers are looking to the burgeoning home do-it-yourself field.

"Developments, now in the testing stage, may make it possible to produce a tool that will take its place next to the power saw and electric drill in the home workshop," says Clark Tryon, sales manager of The Ramset Fastening System.

Basically, all powder-actuated tools use gunpowder as a driving force to anchor wood to steel, steel to concrete, steel to steel, or fabricated hard materials to steel. Nail-like alloy steel fasteners or "studs" come in a variety of widths and lengths, are produced in both plain and threaded heads.

Safety Features

Big selling points include low initial purchase price, moderate maintenance costs, and relative simplicity of operation.

In addition, some manufacturers run their own short training course which highlights basic operational techniques and preventive maintenance measures.

JOB VERSATILITY is big selling point in latest model powder-actuated tools. Remington's Model 455 can do up to 6 fastenings a minute, converts from 1/4 in. stud capacity to 3/8 in. in less than 90 seconds.

A fledgling operator learns, for example, that the tool firing end must be flush against a surface before it will operate. This built-in safety feature helps guard against possible ricochet and injury to fellow workers.

He's taught, too, that the degree of fastener penetration can be regulated to a fine point by using different powder charges.

Tool producers point out that these pre-use tips go a long way toward making a satisfied customer and a likely prospect for future sales.

In a recent contest sponsored by one big tool firm, 72 new uses for its product line were found.

One entrant reported that job-time required to fasten steel plates to precast concrete beams was cut from 15 minutes to 10 seconds each. He estimated his job costs were cut 40 pct.

Time Savings

Another outfit used the tool to fasten a brick facade to a fire wall. Job time, it figured, was cut by 120 hours.

Both Ramset and Remington have recently brought out new models that can be used for either a 3/8 in. or 1/4 in. fastener with a simple change of the tool's barrel. To make the changeover in earlier models, the entire lower assembly had to be removed.

Ramset feels that it now has a tool that can be used for 90 pct of the usual construction fastening jobs. And, costwise, the new model sells for $35 less than its predecessor.

SPECIAL REPORT

Job Enlargement Is Worth Checking

Job enlargement means giving a worker more responsibility, upgrading skills . . . It can mean big money savings, better job efficiency, widened employee interests—*By G. J. McManus.*

◆ IN THESE DAYS of automation and assembly lines, some people are thinking the other way. They call it, "job enlargement." As the name implies, it means giving the worker more responsibility; getting him away from monotonous, repetitive operations.

It has its advantages—and limitations. It's not easy to work out in a union shop, because of contract restrictions. But it has been done.

Advocates claim job enlargement can bring: (1) important money savings; (2) greater work efficiency; and (3) greater employee interest in his job.

Today's specialization trend has resulted in jobs that have been broken down too fine, say people like NYU's Peter Drucker. He adds that you can simplify work and organize operations without taking from the individual the opportunity to do an integrated, meaningful job.

Note of Caution

Companies that have applied the concept are more cautious in their pronouncements. At Detroit Edison, they warn against hasty application of job enlargement programs. At International Business Machines Corp., they make it clear job enlargement is no cure-all.

The problems and limitations of job enlargement should not be overlooked. But neither should the possibilities. A close look at both IBM and Detroit Edison operations indicates the concept may be even more important than was originally thought.

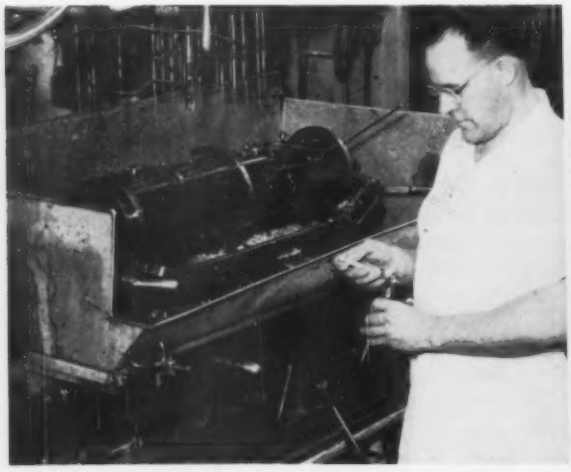
The most significant type of job enlargement at IBM's Poughkeepsie, N. Y., plant is that involving increased responsibility. Key man in the production set-up at IBM is the "Manager." He is comparable to a foreman in the sense that he is in charge of the smallest production subdivision. But his job has been enlarged at IBM to the point where he is more like the manager of a small business.

IBM managers prepare their own budgets, recommend pay raises and promotions, have the main say in the hiring of men for their departments. The manager handles gripes and personal problems. He is consulted rather than advised on top-level decisions affecting his department.

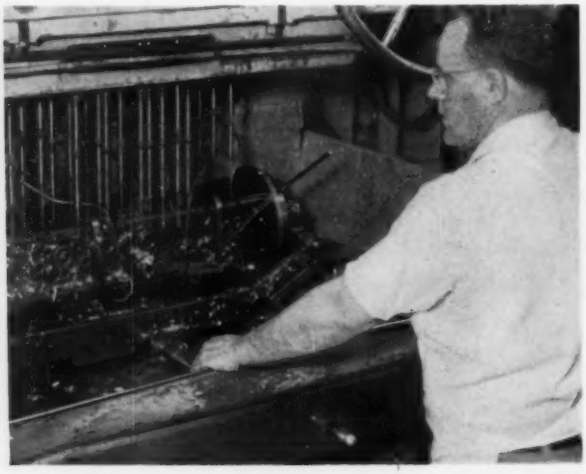
How It Works

What this does is place decisive authority in close personal contact with the individual worker. Advancement, pay and job assignments are based on personal evaluation, not rigid standards.

Job Interest Pays Off



CHECKING drill is a regular part of this operator's job at IBM's Poughkeepsie plant. He attends to all work preliminaries, understands the whole operation.



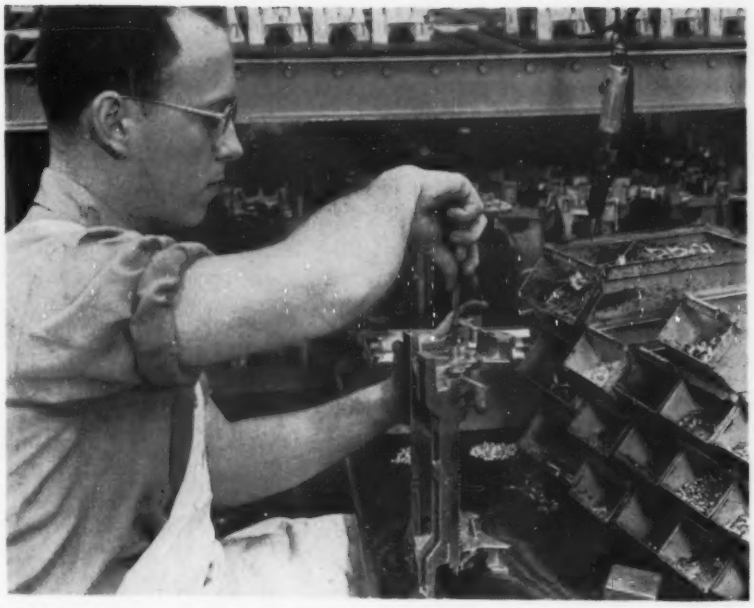
DRILLING cycles for business machine casting finds operator alert and attentive. He immediately spotted a small drill break, prevented further trouble.

Effectiveness of this compact work structure is evident from a consideration of morale indicators. Twenty per cent of the workers at Poughkeepsie participate in the company's educational program. In a set-up where pay is on a straight hourly basis, work stoppages due to labor disputes are unheard of. Company policy allows a man to go to the very top with a complaint but the number of grievances that demand top-level hearings amounts to a trickle.

And personal knowledge of the worker paves the way for intelligent job enlargement throughout the plant. In the wiring of calculator panels at Poughkeepsie, you will see the jobs of inserting wires, soldering leads and making engineering changes varied.

More important than any extension of physical operations is the sense of performing a meaningful and useful function. An incident of the machining floor brought this out.

A man was working a casting through a drilling cycle. The casting passed under five multiple-spindle drills to receive at least 50 holes. At the close of the cycle, the operator took a quick look at his work. No inspection function was called for but he gave the casting a quick once-over. He spotted a tiny drill that had broken off in the casting, stopped the drills and made repairs.



ASSEMBLY operations at IBM call for wide variety of skills. Job rotation equips men to handle more than one station, gives production flexibility.

Company's assistant superintendent, machining and processing, at Poughkeepsie, pointed out that the operation could easily have continued until the missing holes snarled up subsequent assembly. The machine operator at IBM sets up his own equipment, gage and tools, sees that cutting edges are right. He is performing a complete job, not just going through memorized motions.

Set-up men have been virtually eliminated at Poughkeepsie by this enlargement of the operator's function. Much has been made of this manpower saving but company officials caution against oversimplifying the thing. Rapid IBM expansion made it necessary to bring in many untrained people. In part, the elimination of set-up men has been simply a case of operators acquiring normal skills.

Means Savings

There are, however, very real savings being realized through job enlargement. Recently 50 inspection operations were eliminated by making production workers responsible for their inspection through quality control methods. Detroit Edison's accounting department reports similar success in combining inspection and processing work. Advantage of this early check is that you don't waste time in further processing of a faulty piece after a defect is disclosed.

A business machine assembly line started last year with just three experienced men. Two of these have moved up to manager jobs and gone to other departments. To keep replacements coming, the assembly manager makes a definite effort to broaden the individual's knowledge through job rotation and progression.

Broadens Skills

One aim of this kind of enlargement is to develop men who can do final inspection and managerial work. The other is to permit greater production flexibility. Every man works a full 40 hours at IBM. Production variety and the large amount of special work make it highly desirable that a man know more than one job. Rotation and other forms of job enlargement give you men who can

FINE WORK is done by this blind IBM worker. Aligning jig enables him to insert relays in gate.

move from slack to busy stations, keeping themselves occupied and production flowing.

The card punch base assembly line provides another example of the flexibility that job enlargement permits. Space and scheduling considerations made it necessary to compress this assembly. The line was cut considerably from its original size by decreasing the number of stations and increasing the operations at each station.

It is worth noting that the efficiency of the operation increased when the jobs were enlarged. But again, company men caution against reading too much into the bare figures. Other changes were made at the same time the line was shortened.

No Special Formula

Probably the only generalization you can make about job enlargement is that there are no general rules. At Poughkeepsie they will tell you it's strictly business. Job enlargement is fine but business comes first. At the same time, you will find places where the company has gone to elaborate lengths in job enlargement mainly for humanitarian reasons.

One example of this is the assembly of a relay system by a blind man. His job was enlarged by means of a big aligning fixture. He puts an intricate assembly together all by touch. Other handicapped people have received similar consideration. IBM's experience in this area shows that a little imagination can do wonders in broadening the work lives of supposedly limited people.

What about automation and job enlargement? Is the day coming when men will do nothing but push buttons? Detroit Edison's J. Douglas Elliott feels very strongly that just the reverse is true. The type of work that lends itself to electronic programming is the simple, repetitious kind. Machines are taking over the drudgery, leaving interesting work for men.

General superintendent of revenue accounting for Detroit Edison, Mr. Elliott backs up this statement with examples of work being done by office machines. Machines will check account statements and meter readings, passing those that are in order, kicking out those where a discrepancy is indicated. Formerly a clerk had to wade through the whole mess.

Incentive Factor

Mr. Elliott has worked extensively with job enlargement. He tells of one case where filing and key punch functions were consolidated in one group. Prior to the consolidation, Detroit Edison had been planning to hire more people for the separated groups. Two years later the consolidated unit was handling 10 pct more work with no additional people.

In this case, job enlargement raised the pay rates of some. But there was a net saving to the company because of increased production. The consolidation revealed that the previous work arrangement had involved considerable overlapping. The change reduced overtime, cut absences by 10 pct.

Mr. Elliott can offer other examples of job enlargement benefits but his more forceful argument is based on a study of 122 electric utility companies. Comparing the billing methods of these, he found that the more highly specialized the method, the higher the cost. The group with the least specialization had costs 40 pct below that with the greatest specialization.

Apart from the cost questions, Mr. Elliott feels job enlargement is one of the keys to job satisfaction. At the same time, he recognizes that certain skills are incompatable and certain human whims go against any logical pattern.

At Detroit Edison, they have consolidated in one group of clerks the function of handling all telephone contacts with customers. But they keep the maintenance of customer records as a separate function, requiring different people and skills.

Successful application of job enlargement calls for careful consideration, say Detroit Edison people. Make sure you have your program fully laid out before you move. Take the time to explain matters to workers affected.

Well Received

On the whole, Detroit Edison feels job enlargement has been well received by employees. Studies by an outside consultant show the program has brought job satisfaction. The company is pleased with results but feels that broader application of job enlargement will be necessary before a conclusive evaluation can be made.

These are a few of the considerations in job enlargement. The concept is not new, particularly as concerns responsibility. As far back as 1927, General Motors officials were discussing and applying the principle of delegated authority in management. Behind the recent resurgence of Ford Motor Co. has been a realization of the need for placing adequate authority at the operating levels.

Objection

But acceptance of job enlargement stops abruptly when you get to direct labor. For one thing, engineers feel that mass production is dependent on breaking operations down into fine job increments. Secondly, many companies feel job enlargement programs just ask for union trouble.

There appears to be some justification for this attitude. Enlarging jobs means changing pay and labor classifications, and there's no blinking at the fact that many unions are suspicious of company action in these areas. Unions have gone to the mat over programs involving job enlargement. There have been grievances settled only after outside arbitration.

But job enlargement is a legitimate function of management. Arbitration people have upheld company programs. Certainly possibility of union opposition should not be overlooked. Education and careful planning should accompany any program of job enlargement.

UNIONS: Your Engineers Are Vulnerable

Management group takes a good look at what unions have up their sleeves for '56 . . . Get warning that engineers and other white-collar workers are susceptible . . . Short work-week—By *K. W. Bennett.*

◆ WHICH WAY will labor jump in 1956? Management people attending American Management Association's meeting in Chicago asked themselves — and labor leaders — that question. They came up with a variety of answers. Here's what it boils down to:

This year, Labor will push a heavy organizing drive.

Notable campaigns will be made in the South, and among white collar workers—and engineers.

John Gagnon, Olin Mathieson Chemical Corp., warned that engineers are more vulnerable to union organizing than many people think. Engineering starting salaries are good, but pay scales for men with several years' service often do not measure up to the wage gains made by many production workers in recent years. And the same is true for many of the white collar employee groups.

Short Work Week

An example: A company which recently lost six engineers, each having three to four years' experience. Replacements were hired, but at higher salaries and the benefits of three years' experience and training per man were lost.

John S. Bugas, vice president—industrial relations, Ford Motor Co., warned that labor is out to get the 32-hour week. He is bracing for a short-work-week drive by the United Auto Workers, and says his company will resist such demands. On the West Coast, the International Assn. of Machinists has demanded the 35-hour week and other concessions from Convair Div. of General Dynamics Corp., and probably will extend this demand to other companies. (See page 73.) Labor generally can be expected to shoot for a shorter work week

Dave Beck, president, International Brotherhood of Teamsters, bluntly underlined the coming drive for more members, in a telephoned address to the management group. The teamsters, now 1.5 million strong, are out to pick up an additional 1.5 million members among such groups as warehouse drivers, bakery truck drivers, auto salesmen, canning and dairy products.

You can look for further union members, particularly in oil, chemicals, textile, and aluminum.

Another conclusion: the Continental Can Co. Supplementary Unemployment Benefit plan agreement with the United Steel Workers can be expected to set a pattern for the expected demand by USW on the steel industry.

Wage Guarantees

Continental Can's W. A. Lacke pointed out that the plan, which covers only 14,000 workers, provides for a company contribution of 3 cents per hour per worker, or about $900,000 per year. An additional two cents is "contingent," but of the total 5 cents, only 3 cents is paid regularly.

Continental's plan is worded in such a way that liability for seasonal workers is reduced. At the same time, strenuous efforts have been made in a single test plant to reduce seasonal variations. The plan has worked, but it involves knotty problems of interplant and interdepartment seniority. One conclusion: the means Continental Can used to soften the impact of SUB on company earnings won't work for basic steel, because the industry is considerably less seasonal, can't depend as heavily on excluding seasonal workers.

One fact that aroused considerable attention in the SUB picture: several craft unions have turned down SUB. Rank and file members of a number of industrial unions would prefer a 5 cents per hour increase in their pay envelope to a guarantee of 52 weeks of 65 pct of salary (SUB plus unemployment compensation) in a future period of slow business. Conferees concluded that union leaders will have less internal support for SUB than in demand for a flat pay increase.

What Labor Thinks

A. J. HAYES, International president, International Association of Machinists: "Automation will be a long run blessing, but in the short run may frighten workers who fear the possibility of layoffs. The problem can't be solved on a single company basis."

DAVE BECK, president, International Brotherhood of Teamsters, Chauffeurs, Warehousemen & Helpers: "The Teamster union funds invested will probably be increased if the union will grant the right to increase the amount we have invested in corporations."

MAURICE HUTCHINSON, president, Carpenter's Brotherhood: "Neither political party has 15 million labor votes sewed up."

WESTINGHOUSE: Where Strike Pinch Hurts

Serious problems have been avoided by most customers . . . But worst is yet to come for users of heavy equipment . . . Customers have confidence in company, continue to place orders for future delivery.

◆ HOW WELL has industry weathered the long Westinghouse strike?

A survey by IRON AGE editors indicates there have been few serious problems, but quite a few close shaves among companies depending on Westinghouse for various types of electrical equipment.

Despite the length of the strike, which began last October, many long-time customers of Westinghouse have gone out of their way to demonstrate their confidence in the company. For instance, the big steel producer that placed orders for two 500 hp motors for a new blooming mill and motors totaling 9500 hp for a universal roughing mill and equipment for two electric furnaces—after the strike began.

Worst to Come

The real pinch may not come until long after the strike settlement and Westinghouse gets back into full production. Users of heavy electrical equipment will be in worst shape. Says a Westinghouse spokesman:

"For heavy equipment in production at strike-bound plants, shipment schedules will be extended by length of strike plus one to three weeks. New orders for long-term delivery will be less affected."

Meanwhile, a lot of breath-holding is going on. Like the steel company that sent a mill transformer to a Westinghouse plant for repair three weeks before the strike started. The transformer is still there. A spare transformer has been pressed into service. But if that burns out, the mill will be in real trouble.

Fortunately, not all Westinghouse plants were struck. Some 58 plants continued to operate and the company claims 6000 workers crossed picket lines to return to work during the strike. In fourth quarter of '55, the company billed net sales of $306.5 million.

Here's the picture:

Steel . . . No widespread trouble—yet. One mill is reported in bad straits for lack of drive motors ordered from Westinghouse. Most expansion programs are not far enough along to be hurting for electrical equipment and controls. A Midwestern mill which has $9 million worth of orders on Westinghouse books in connection with a $200 million expansion program expects to be "inconvenienced, but not hurt" by the strike. A company official says Westinghouse has been able to keep abreast of engineering, diagram, foundation outlines, and layout requirements. Effect of the strike on steel expansion programs probably will show up later.

Mill Builders . . . One firm has had several jobs delayed one to two months for lack of motors and controls. Another has been forced to deliver equipment without electric motors and controls, which will be installed in the field as available. Meanwhile, equipment cannot be used by customers. A third has run into no trouble so far but is keeping its fingers crossed for the future—perhaps the near future.

Coal . . . Lack of switchgear equipment has held up one mine project, and there have been delays in completion of mine equipment. Mine motors have been available, but last ones received from Westinghouse had to be finished in the field.

The Strike: Its Cost

To Company and Employees

▪ In earnings: Losses due to strikes at 40 plants through most of 4th quarter amounted to $1,037,000

▪ In wages: Estimated wage loss by striking employees is $950,000 per working day. $750,000 applies to IUE members and $200,000 to UE members. Management salary cuts effective Dec. 1, 1955, ranged from 50 pct for officers to 15 pct.

To Suppliers

▪ Westinghouse has continued to take in materials on a highly selective basis. Orders for materials freely available were cut back at start of strike.

▪ On critical raw materials, continued to buy up to predetermined inventory levels. Materials include copper steel, and aluminum. Later reductions will be made up gradually.

PICKET LINE violence flared more than once in the Westinghouse strike. Some 100 workers were discharged for this and other reasons. Firings developed into big issue between the company and striking unions.

Automotive . . . At least two major installations were delayed at plants of one large car producer because motors, transformers, and switchgear equipment ordered before the strike were not delivered. Another electrical manufacturer eventually came through and construction was resumed. Fractional hp motors have been no problem in Detroit.

Public utilities apparently are sticking to their Westinghouse orders almost without exception, and sweating it out. A large machine tool builder dependent on Westinghouse for small motors and controls says it is getting along fine with shipments from Westinghouse field warehouse stocks. "We have continued to place our normal amount of orders with them for motors and controls," says a company official.

Encouraging to Westinghouse is that many companies are leaving their orders on the books as a reorder with an open delivery date.

Apparently, Westinghouse's competitors have not seen fit to declare a "moratorium" on competition. For instance, in the hotly-competitive motor field: "Producers are turning the heat on us from every possible angle to get the Westinghouse business," says a Cleveland purchasing agent. "All the producers feel they should have all the business and are pulling every string in the book to get the orders."

In the Midwest, the situation is becoming critical in spare parts for Westinghouse equipment. Supply of replacement parts in the area were good before the strike started, but warehouse stocks are being wiped out. Where part is built to National Electrical Manufacturers Assn. specifications, Westinghouse competitors are supplying replacements. But where the part is made under strictly Westinghouse specs, it is becoming necessary to subcontract for manufacture of these parts.

Enters Fifth Month

Westinghouse customers are not canceling on orders for new heavy equipment in large numbers, but some industrial accounts have decided to buy competitive equipment, and backlogs of competitors are beginning to pile up.

Stepped-up production schedules of Westinghouse competitors has gone a long way toward minimizing impact of the strike on industry.

As the walkout entered its fifth month early this week, an "all-out" effort to end it got underway in Washington. Various state and federal government efforts to reach a basis for settlement had been unsuccessful.

What It's All About

▪ Westinghouse insistence that striking unions agree to a 5-year contract similar to that negotiated by its principal competitor —General Electric.

▪ James B. Carey, president of the International Union of Electrical Workers (CIO), contended that the present agreement was reopenable only on wages and had one year to go before other issues, such as length of contract could be negotiated.

Mr. Carey denies reports he wants a better contract than the union negotiated with General Electric.

▪ Another principal issue: Westinghouse's reservation of the right to make time studies of so-called non-production, or day workers; the union insistence on certain "safeguards" to protect workers against possible management errors in setting up standards for these jobs.

▪ Proposals to arbitrate the issues were rejected by the company on grounds that it would be giving up management rights to outsiders not familiar with the company's production and competitive problems.

EXPANSION

STEEL: New York Lures New Expansion

State holds out market potential, site advantages to lure new steel mill . . . Seaway makes Lake Ontario sites attractive . . . Hudson valley also possible location . . . Mills show interest—*By G. G. Carr.*

◆ NEW YORK STATE is pushing aggressively for a share of the new steel expansion that is assured the industry.

Assets in promoting construction of a new, integrated mill within the Empire State's borders are the state's high concentration of metalworking, hefty industrial growth, local sources of ore, limestone and scrap, and an excellent network of rail, truck and water transportation routes.

Most important persuader for a site on Lake Ontario is the St. Lawrence Seaway, which will provide easy access to the new Labrador iron ore mines as well as access to the Great Lakes and barge routes. A Hudson River site has advantage of proximity to markets, also deep water ore routes.

Three Sites

Sites now proposed are the Kingston neighborhood in the Hudson River valley and either Oswego or Sodus on Lake Ontario.

Any promotion of a New York site has to take into consideration steel capacity already in the Northeast. Steel capacity in the Buffalo district is 7,015,100 tons and in the balance of New York, New Jersey and New England, 848,980 tons. The Philadelphia district now has a total capacity of 17,307,910 tons. Ingot expansions of Bethlehem Steel at Sparrows Point and Lackawanna have been announced.

But Edward T. Dickinson, state commerce commissioner, feels strongly that existing plants have more than enough business close at hand. In addition, freight rates are tending upward. A steel mill located in central or eastern New York would have a substantial freight advantage for much of that state, New Jersey and New England.

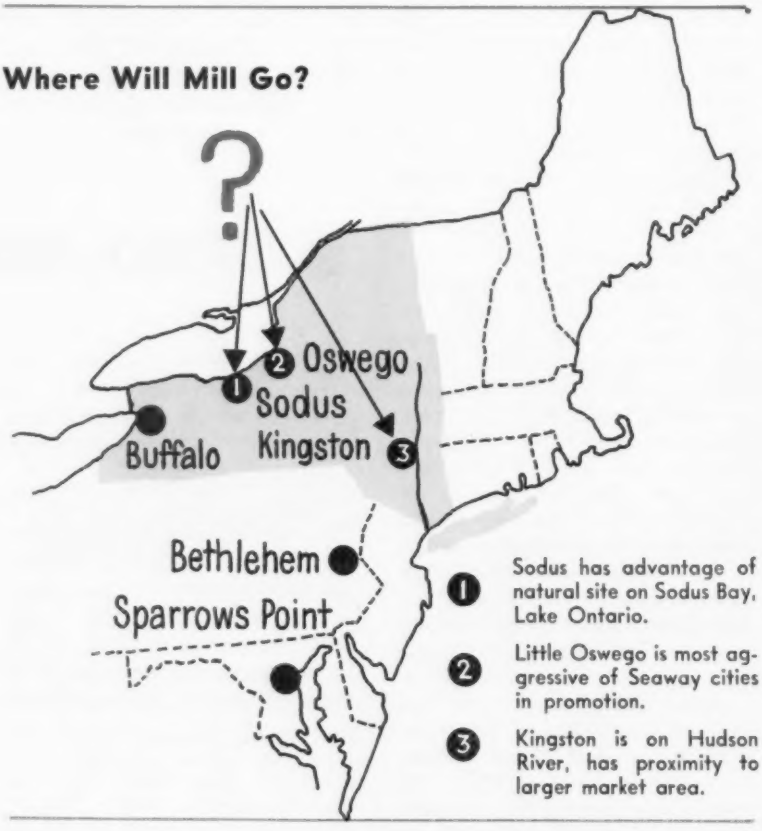
Expansion Cost Up

But Mr. Dickinson adds another factor. He believes that the cost of expanding existing plants is rapidly approaching the cost of new facilities. Growth at many sites is increasingly impractical. He concedes this varies widely from one plant to another, but stresses that it is a significant problem for several firms.

The market should be meaty. New York State alone has 2516 metalworking plants employing 630,628 plant workers, according to THE IRON AGE Basic Marketing Data, 1954. Adding New England and New Jersey gives a total for the area of 23,303 plants with more than 1.5 million workers, or 25.11 pct of the U. S. metalworking employment.

Steel Imbalance

Steel consumption in 1955 for all industries in New York State has been estimated as high as 8.3 million tons. The New York Commerce Dept. feels that 7.8 million tons for all industries including metalworking, construction and others would be reasonable.


Where Will Mill Go?
?
2 Oswego
1 Sodus
Buffalo
Kingston 3
Bethlehem
Sparrows Point
1 Sodus has advantage of natural site on Sodus Bay, Lake Ontario.
2 Little Oswego is most aggressive of Seaway cities in promotion.
3 Kingston is on Hudson River, has proximity to larger market area.

Estimated output of all finished mill products for the state in 1955 is 4.3 million tons. This leaves an imbalance of at least 1.4 million tons between production and consumption, using only the most conservative consumption figures. And a considerable tonnage of steel produced in New York is shipped out of the state in unfabricated form.

Commissioner Dickinson points out that these figures cover New York State alone. Steel needs of the 8-state area, including New England and New Jersey, are vastly greater — over 14 million tons at the minimum.

A recent survey of Syracuse area manufacturers showed that metalworkers in the center of the state were reaching out as far as Warren, Ohio, for steel. While this is to some degree a reflection of needs for various mill products, it also reveals that N. Y. industry is paying some sizeable freight tabs for its metal.

Geography Helps

Geography is a major weapon in the state's campaign for a new mill. New York boasts an excellent system of railroads and highways (including the spanking new Thruway) and an almost unequalled waterways network. The Hudson River is navigable by ships of 27 ft draft as far as Albany, and Congress has approved (but not yet appropriated funds) deepening the channel to 35 ft. On the Great Lakes are several excellent harbors, and on Lake Ontario specifically, both Sodus and Oswego have good port facilities. Water delivery of ores from Labrador or other foreign sources is now possible, and the St. Lawrence Seaway and deepening the Hudson will make possible direct shipment in deep draft vessels.

At least one large steel company is reported as "very interested" in a new mill within the state, and none has turned the idea down flatly. With durable goods industries continuing to expand within the state and in adjacent areas, New York feels that additional steel capacity is now a most attractive proposition.

EXPANSION IN INDUSTRY

Aluminum:

Details of Reynolds' $43 million program.

Details of Reynolds Metals Company's recently announced $43 million expansion program were revealed this week by Louis J. Reynolds, executive vice-president.

The new facilities, which will support the new 200 million lb aluminum reduction plant now being built at Lister Hill, Ala., will consist primarily of increased alumina production capacity and additional sheet rolling equipment.

Reynolds will spend $25-$30 million to boost production of its La Quinta (Corpus Christie), Tex., alumina reduction plant by 50 pct to about 148,000 tons annually. Related improvements will include enlargement of bauxite storage and pier areas, and dredging the ship channel. Contracts for the work have been let to Bechtel Construction Corp., San Francisco. Work will start immediately, with about 2000 workers on the job.

Expansion at the Sheffield, Ala., rolling mills will run about $13 million, include $4.866 million for new 4-high reversing hot sheet mill and building to house it, $2,956,000 for new sheet cold-rolling facilities, and $1.667 million for new soaking pits.

Automotive:

Integrated manufacturing returns to North Ohio.

Completely integrated auto manufacturing is on the way back to northern Ohio for the first time since 1932.

Chevrolet Div. announced it would put up its largest assembly plant, estimated to cost over $100 million, near Warren, O. General Manager T. H. Keating declared the plant will produce 74 cars and 30 trucks per hour by fall, 1957. It will employ 8000 salaried and hourly workers.

In making the announcement Mr. Keating said, "This will be the largest assembly plant thus far; in employment, production capacity and area, a fact which bespeaks our confidence in northeastern Ohio as one of the nation's expanding industrial and marketing areas."

Although all automotive components are manufactured in Ohio, the area has had no complete automotive assembly plant since Ford sold its Cleveland assembly plant.

Expansion Briefs

Westinghouse Electric Corp., acquired land near Dover, N. J.; multi-million dollar plant to manufacture electric stairways.

Square D Co., Cleveland; manufacturers of electrical equipment; will spend $9 million for new plants and capital improvements.

National Lead Co., New York; 25 pct expansion in capacity; ilmenite (titanium-bearing ore) mine and mill; Tahawus, N. Y.

Simplicity Engineering Co., Durand, Mich.; new 50,000 sq ft building; increase 50 pct.

Frank G. Hough Co., subsidiary of International Harvester; Libertyville, Ill.; 55,000 sq ft plant addition; increase production of tractor-shovels.

TRADE: Strange Reasoning Aids Reds

Eased U. S. embargo lets Russia get machine tools, other vital goods . . . Shipments go via Britain . . . Condition result of 1954 action, brings Administration under fire—*By N. R. Regeimbal.*

◆ AN EISENHOWER administration policy set in 1954, which permits shipments of machine tools and other strategic goods to Russia via British ports, is under attack by an indignant group of Democrats and Republicans.

High on the list of items which a congressional group says should never have been stricken from the government embargo list are machine tools, scores of types of machinery, copper, and many other metals.

The Administration, acting nearly two years ago at the urging of the British, struck all these strategic categories from its list of items barred from the Communists. Since that time, shipments with a total value of millions of dollars have moved from U. S. ports to British ports, and shipped to Communist ports.

Blame Departments

The U. S. does not deal directly with the Reds. The British do, and they have been acting as "freight forwarders."

Most of the criticism is aimed at Commerce and State Departments for pushing for relaxation of Free World export controls.

Defense Dept. machine tool expert John Williams, and a former Commerce Dept. machine tool specialist, Ralph R. Baldenhofer (now executive vice-president of the Thompson Grinder Co., Springfield, O), agree that permitting our allies to ship machine tools to the Reds has materially aided them in building war potential.

The subcommittee says British shipments of machine tools to Russia have risen from $358,000 in the first half of 1954 to $10,563,884 in the final half of 1955 as a direct result of the decontrol agreement.

No Size Limit

Western nations are giving Russia war production a three-to-five-year push by selling them machine tools, Mr. Williams declares. By buying even one tool, he adds, the Reds can copy it and save years of engineering research.

The U. S., Mr. Williams adds, wanted to limit the size of horizontal boring machines which could be shipped to the Reds to 6.3 in. spindle diameter, but the British are shipping six machines with a 7.9 in. diam. Such large machines, he contends, are used almost entirely in defense work.

Among the machines decontrolled are precision horizontal boring, drilling, and milling machines; vertical turret lathes of up to 75 in., and vertical boring mills up to 96 in.; hydraulic and mechanical presses to 1000 tons, dynamic balancing machines.

Shipments Mount

Other items in the decontrolled list include copper wire (copper ore is still embargoed) electric power generating equipment; transportation equipment; electronic equipment; minerals and metals; and general industrial equipment.

The Free World has shipped 254.1 million lb of copper wire and other copper products to the Reds since the decontrol, with the British accounting for 72.8 million lb, the subcommittee says.

"Lace" Parts For Jets

New Approach Features Lighter Weight

Jet engines of the future will have new lightweight cores constructed with lacey-type parts. Fabrication technique developed at General Electric's aircraft gas turbine facilities, Evendale, O., offers strength-to-weight ratios which compare favorably with solid metals—in some cases reported as much as 1000 to 1. Process is also applicable to guided missiles cores and internal components.

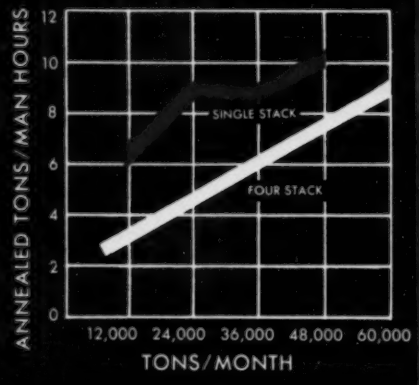
QUESTION:

What KIND of annealing furnaces create the best working conditions for most annealed tons per man hour?

ANSWER:

THE LEE WILSON SINGLE STACK PORTABLE BASE FURNACES!

PROVED LOWEST LABOR COST PER TON



Based on studies of the most efficiently operated plants for both single stack and four stack furnaces.

NO OTHER KIND OF INSTALLATION IS SO CLEAN, COMFORTABLE AND EFFICIENT AS THIS ALL SINGLE STACK ANNEALING DEPARTMENT!

Lee Wilson

ENGINEERING COMPANY, Inc.
CLEVELAND, OHIO

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Considering that it takes years to establish a reputation, isn't it a mistake to overlook the use of copper or copper components in your product that can protect its good name?

For one big thing about this metal is that it endures. It serves for years, generations, centuries.

This characteristic of copper can help you to protect your Company's future. For your customers like to get their money's worth. And that includes long-term use. Endow your product *now* with copper's own long life!

Copper can look back on a history as old as man's . . . and forward to a future as promising. *Stay* in business with *copper!*

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Easy to machine, form, draw, stamp, polish, plate, etc.

Welds readily . . . excellent for soldering and brazing

REPORT TO MANAGEMENT

Off to a Good Start

Statisticians have had time to take a good look at January business figures. The results are just about what you expected, or should have expected. Business in general seldom looked so good.

It isn't just that January was good. But you get the idea that the conditions that brought about its good record will continue for more than a few months in the future.

The Federal Reserve Board's index of industrial production remained at the seasonally adjusted record rate of 144, continuing from December. Employment in nonagricultural businesses also continued at a record level, although there was a moderate decline in manufacturing.

Output of durable goods continued at record levels, with the exception of automobiles; and production of nondurable goods and minerals maintained peak rates.

Construction Can Top Everything

Don't get excited over a slow start in housing. Construction as a whole is headed for its biggest year. And furthermore, the added strength will come where it will do metalworking the most good—in highways and heavy construction.

Estimates of those closest to the industry indicate that total construction may reach $60 billion this year. More than $44.5 billion will be in new building, the remainder in maintenance and repair.

January housing starts continued at about the December level—slightly under the annual rate of just under 1.2 million. But total value of contract awards was at an unusually high level for the season. For the three months period ending in January, rate was one-sixth over a year ago.

Labor and Health Insurance

You can expect that one of labor's prime targets in the future will be obtaining broader and broader health insurance programs—with management absorbing more and more of the cost.

First objective is to get hospitalization and disability programs. This has been accomplished in wide segments of business and industry. Next step is to widen the concept to include preventive medicine and diagnostic measures, as well as medical care.

Just what demands will be made on your business, and what your company attitude may be, will vary widely. The point is to remember that the trend is here. It will be wise to pay strict attention to your industrial medicine program, make it an important part of management.

How Far Should Committees Rule?

There's no real argument against committee rule in high level corporation decisions. Success of General Motors, for example, as the leading exponent of committee rule, would tend to discourage that.

But carrying committee decisions into day-to-day operations is a current phase of management that may be overdone. There may be reasonably high ranking officials in your own organization that are being frustrated by committees.

You can't even be sure that committee action is the safest, particularly in these days when to delay may be costly. When a quick decision is demanded, a committee can be a liability. There are currently some striking examples in important companies where "committee" is becoming a bad word.

INDUSTRIAL BRIEFS

Spanish Inquisition . . . A group of six Spanish foundry industry executives headed by Jose Orejas, manager and owner of shipbuilding yards in Oviedo, Spain, recently completed an inspection tour of the foundry facilities of Homestead Valve Manufacturing Co., Coraopolis, Pa. The study is sponsored by the International Cooperation Administration as part of its technical exchange program.

Foreign Affair . . . Infilco Inc. designers and manufacturers of equipment for treatment of municipal water supplies, has formed an Australian subsidiary with offices in Sydney. This is Infilco's third foreign subsidiary. A fourth subsidiary is in process of formation in Japan.

Farsighted Approach . . . Union Carbide and Carbon Corp. has announced an alteration in its Undergraduate Scholarship Plan to include teaching scholarships, as well as the research and business career scholarships. The plan now permits allocation of one-fourth of the scholarships to students desiring to enter the teaching profession.

Charlotte Attractive . . . Consolidated Brass Co., after having operated for over a half century in Detroit, Mich., has moved to Charlotte, N. C.

Two's A Crowd . . . Republic Steel Corp. will consolidate its metal door and frame production facilities at a newly created branch of its Truscon Steel Div. in Niles, O. Heretofore, the company has been producing metal doors and frames at two other Ohio locations, the Berger Div. in Canton and the Truscon Steel Div. in Youngstown.

Growing North . . . F. J. Stokes Co. of Canada, Ltd., has been established as a subsidiary of F. J. Stokes Machine Co., Philadelphia, Pa. Headquarters of the company is in Toronto.

Speedy Sabena . . . Sabena, Belgian World Airlines, will purchase another Boeing Intercontinental jet airplane, to be delivered in June, 1960. This brings to four the number of Boeing Intercontinentals ordered by the Belgian World Airlines. The initial purchase of 3 planes cost over $15 million.

Agents . . . General Tool Co., Portland, Ore., Industrial Tool & Supply, Tucson, Ariz., and Charles K. Farley, Rochester, N. Y. have been appointed agents for Taft-Peirce Manufacturing Co., R. I., handling the standard line of fixed gages, air gages, small tools, and magnetic chucks.

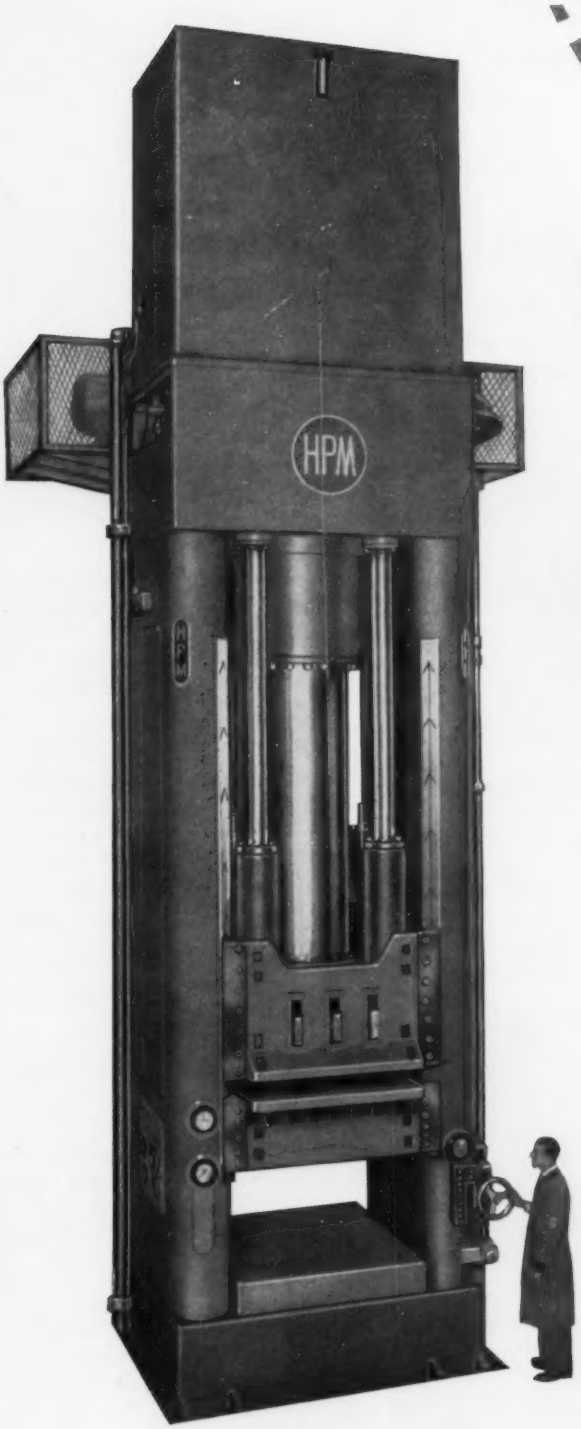
"You're new here aren't you? The pay is terrible . . . But the advances are plentiful!"

Ups and Downs . . . The Board of directors of the Piasecki Helicopter Corp. has unanimously passed a resolution recommending the name of the company be changed to Vertol Aircraft Corp. The name Vertol was derived from a condensation of the words Vertical Take Off and Landing. Change is aimed at removing the confusion which now arises from the fact that a new company, Piasecki Aircraft Corp. has recently been formed.

Silver Screen . . . "Tools of Abundance," a 16 mm color, sound motion picture dealing with the basic functions of various members of what may be termed the "production team"—design engineers, process engineers, tool engineers, tool grinders, machine operators, purchasing, is available for showings to industrial groups at no cost from Wesson Co., Detroit.

Big Purchase . . . Rockwell Manufacturing Co., manufacturers of valves, has acquired Locomotive Finished Materials Co., Atchison, Kansas. This is the largest Rockwell acquisition in eleven years. LFM, with almost half a million square feet of production facilities in Atchison and in St. Joseph, Mo., has one of the largest steel foundry and machining facilities west of the Mississippi River.

New Normal . . . A new continuous normalizing line capable of processing 15 tons per hour of low carbon steel vitreous enameling stock has been ordered by U. S. Steel Corp., for its Irvin Works. Surface Combustion Corp., Toledo, O., is the prime contractor. E. W. Bliss Co. will supply the strip handling equipment. The new facility is expected to be in operation late in 1956.



H-P-M 1000-ton FASTRAVERSE sheet metal drawing press equipped with a 300-ton die cushion and 400-ton blankholder.

50% REDUCTIONS CUT DRAWING COSTS

"We're Very Pleased With Our H-P-Ms"

Mr. Homer F. Folk, Manager of Pressed Steel Department at A. C. F. Industries, Milton, Pa., reports, "We need an all-around versatile press and our H-P-M can be easily and quickly set-up and regulated for each specific draw job. The accurate control of drawing speed plus total elimination of high impact stresses guarantees proper metal flow and is one of the important factors in making reductions of 50% in one operation possible."

The H-P-M FASTRAVERSE press is infinitely adjustable for a multitude of drawing requirements. Independent control of each hydraulic action provides just the right tonnage for each job. Investigate these versatile all-hydraulic production units. Draw your sheet metal hydraulically. Write today for complete information.

METAL WORKING DIVISION
THE HYDRAULIC PRESS MFG. CO.
Mount Gilead, Ohio, U.S.A.

HPM

AUTOMOTIVE ASSEMBLY LINE

Is There Really a Good Anti-Trust Case?

Justice Dept. will have a hard time building a case . . . Auto failures have been caused by lack of capital and facilities, not unfair competition . . . There still is room for independent—By *T. L. Carry.*

◆ TRUST BUSTERS are again casting ominous glances in Detroit's direction and loudly beating the drums in favor of breaking up the larger automobile companies.

Stanley N. Barnes, in charge of the Justice Department's anti-trust division, says that there is too much power concentrated in a few companies in the auto industry.

Although, he doesn't say so directly, it is obvious that Mr. Barnes has his eye on General Motors Corp. when he speaks. In a recent speech Mr. Barnes claimed that GM's market penetration last year was over 50 pct compared to 30 pct for Ford. The smaller companies, he said, captured less of the market than they did in 1954 and Chrysler's comeback was at the expense of Ford sales rather than General Motors. Actually, statistics will show that both Ford and GM lost sales to Chrysler last year.

Not Likely . . . Mr. Barnes is not the first man and undoubtedly will not be the last to talk of breaking up the big auto companies. But it is doubtful if the government could successfully prosecute an anti-trust suit against General Motors or any other large auto company.

Regardless of varying opinions on the subject, there is nothing illegal about a company being big and it would be difficult to prove that GM, Ford or Chrysler became big by conspiring to put smaller companies out of business.

Here's why.

At one time or another there have been over 2000 auto manufacturers in this country. In fact, 50 years ago 150 companies were producing less than 25,000 cars.

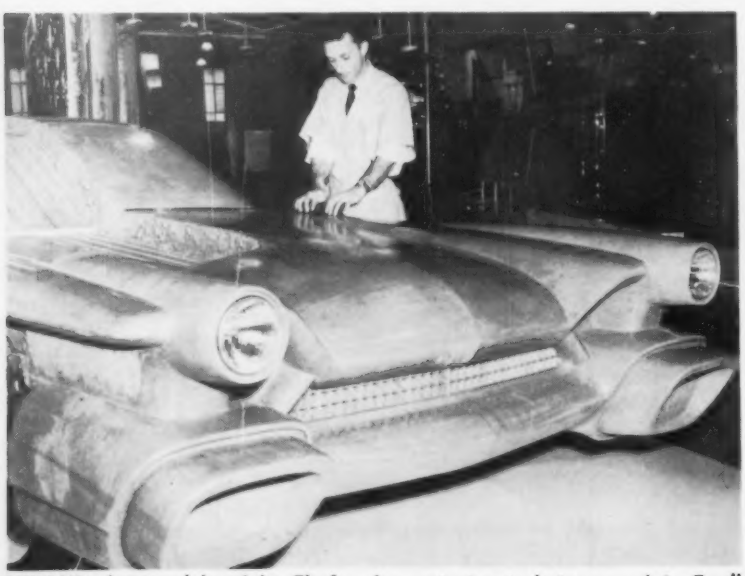
Here's Why . . . On the surface, it appears paradoxical that as the market for cars increased the number of companies producing them steadily dwindled until today there are only five companies actively engaged in making automobiles. But there are several good reasons for it.

The huge size of today's market makes high volume production absolutely necessary.

This high volume cannot be maintained without several large plant installations which call for huge cash outlays. In addition, a company must have enough money to retool on an increasingly frequent basis for new models. So the cost of making cars is almost astronomical today.

Management Problems . . . Smaller companies also suffer as far as management succession is concerned. A young man starting out to carve a career for himself in the industry is inclined to think that his opportunities are better with a larger firm. Because of this attitude it is difficult for a small company to establish a second line management team.

With a lack of incentive for young men, the small company sometimes has to go outside the

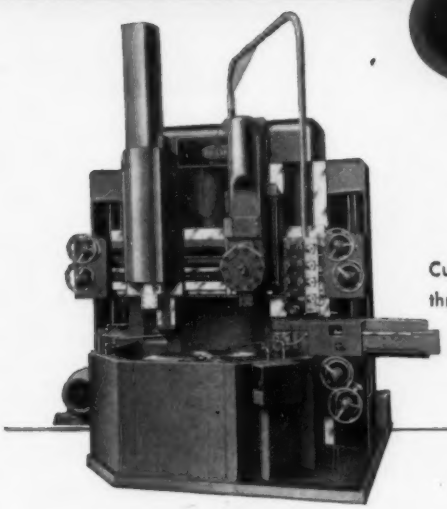


SKILLED clay modeler John Ebefer demonstrates technique used in Ford's Dearborn Styling Center for working out new designs. Result of this particular project will be full-size model of X-1000, a new "idea" car.

Ours is a rich heritage

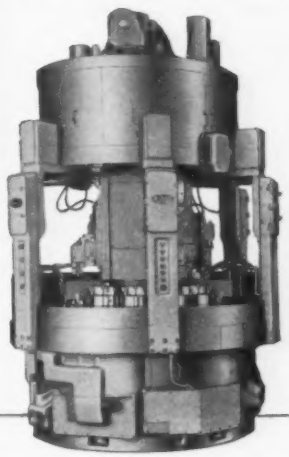
The name "BULLARD" on machine tools dates back three-quarters of a century — to 1880. Bullard tradition stands for advanced design in engineering, quality of craftsmanship and reliable performance. Consistent with today's production requirements and with foresight to the future needs of industry, Bullard Machine Tools have been designed, engineered and built to produce for your highest efficiency.

BULLARD

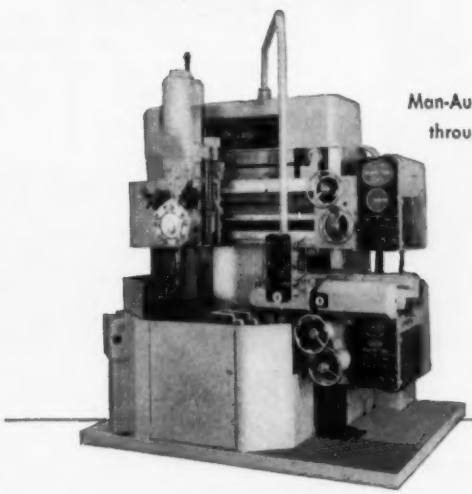


Mult-Au-Matic, Type "L" 10" with 6, 8, 12 or 16 spindles, 14" and 18" with 6 or 8 spindles

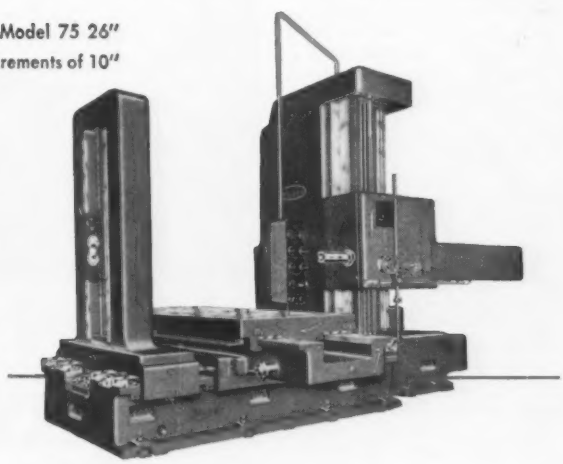
Cut Master V.T.L., Model 75 26" through 76" in increments of 10"



Horizontal Boring, Milling and Drilling Machines, Model 75 3", 4" and 5" Spindle Size, Table Type



Man-Au-Trol V.T.L., Model 75 26" through 76" in increments of 10"



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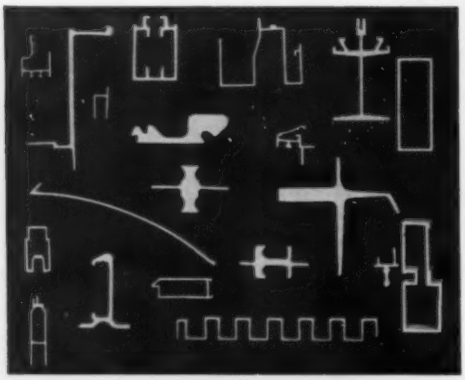
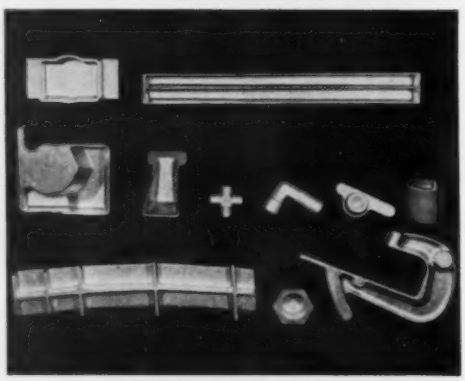
THE BULLARD COMPANY BRIDGEPORT 2, CONNECTICUT

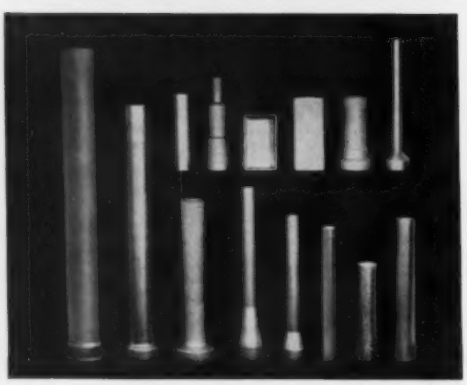
You can make it faster and better with **Harvey Aluminum**



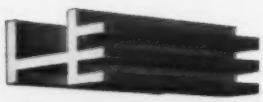
EXTRUSIONS . . . For decorative as well as basic parts, custom-designed aluminum extrusions replace riveted and welded assemblies . . . simultaneously adds strength, simplifies fabrication.



PRESS FORGINGS . . . Where parts must combine maximum strength with savings in weight, cost and manpower, Harvey aluminum forgings often completely solve the problems encountered by the designer.



IMPACT EXTRUSIONS . . . Thin-walled, tubular structures can be produced by this method and held to very close tolerances. Machining is practically eliminated; scrap is greatly reduced.



STRUCTURALS . . . High strength, light weight, workability, corrosion resistance. Aluminum extrusions combine all four . . . are ideal as basic load-bearing members.

MACHINING STOCK . . . Harvey deep-drawn hex and round stock set a new mark in uniform grain structure—consistent from surface to core. This means fast, chatter-free cutting, long tool life, few rejects and true threads.

FORGING STOCK . . . If you make your own forgings in quantity, Harvey extruded forging stock can save many intermediate steps. Custom-designed extrusions whose cross sections approximate the forged blanks may be cut to length.

EXTRUDED PIPE AND TUBE . . . Seamless . . . uniform in structure, size and shape . . . clean and smooth inside and out . . . easily formed. Usable in applications ranging from portable irrigation systems to aircraft heat exchangers.

DRAWN TUBE . . . Combines strength and high finish . . . ideal for TV antennas, furniture, and similar products. Cold drawn for structural uniformity . . . and the temper is specially controlled for good workability.

SCREW MACHINE PRODUCTS . . . The West's largest installation of multiple-spindle screw machines can reduce your manufacturing costs. Harvey carries your job through from engineering to quality control.

Harvey is a leading independent producer of aluminum extrusions in all alloys and all sizes, special extrusions, press forgings, hollow sections, structurals, rod and bar, forging stock, pipe, tube, impact extrusions, aluminum screw machine products and related products. Also similar products in alloy steel and titanium on application.

MAKING THE MOST OF ALUMINUM . . . FOR EVERYONE

HARVEY Aluminum

HARVEY ALUMINUM SALES, INC.
TORRANCE, CALIFORNIA
BRANCH OFFICES IN PRINCIPAL CITIES

Automotive Production

(U. S. and Canada Combined)

WEEK ENDING	CARS	TRUCKS
Feb. 18, 1956	135,160	25,549
Feb. 11, 1956	139,380	27,730
Feb. 19, 1955	180,914	15,730
Feb. 12, 1955	175,353	15,783

*Estimated. Source: *Ward's Reports*

industry in search of capable management talent. James J. Nance, president of Studebaker-Packard Corp., is a good example of this.

However, there is still room in the industry for an Independent producer. Although the percentage is small, there is still a large number of people who want a car that is "different" from anything the Big Three have to offer.

Secret of Success . . . A company that can sell 100,000 cars today at an average price of $2000 will have gross sales of $200 million. If costs are competitive, the profits from such an operation would be very comfortable even though the market penetration by today's standards would be very small.

One of the secrets, if you care to call it that, which enables the Independents to survive is their ability to offer the public something in cars which it is not economically feasible for the larger firms to do. American Motors' unitized body construction and Packard's willingness to introduce such innovations as torsion bar suspension are good examples of this.

Despite threatening speeches made in Washington, there is still room in the industry for small companies. Even though it appears on the surface that monopolies exist, it does not mean a good case.

Canada:

GM strike ends, cost $26 million in wages.

The longest strike in the history of the industry was settled last week with the signing of a new contract between General Motors of Canada and the UAW. After looking over the agreement, it appears the issues could have been settled without the necessity of a 148-day strike.

The strike cost GM workers in Canada over $26 million in wages alone. In addition, the UAW paid out more than $4 million in strike benefits to the 17,000 workers involved. General Motors lost production of more than 60,000 cars.

Was it worth it?

One of the big stumbling blocks to a settlement was the union's insistence that the company pay all hospital and medical insurance costs for the workers. GM insisted that the payments should be on a 50-50 basis and the final settlement is what GM wanted all along.

Another point which held up a settlement was the union's demand that the new contract run only for one year. The settlement calls for a contract which runs for three years and it cannot be opened by either party until Aug. 1, 1958.

Follows Formula

Other major provisions of the contract are similar to the agreement reached by General Motors and the UAW last year.

It provides for an annual improvement factor of 6 cents and also establishes a supplemental unemployment benefit plan.

In addition, pension payments have been increased and the limit on the number of years which can be counted toward retirement eliminated. A wage inequity fund has been established and overtime pay schedules have been revised.

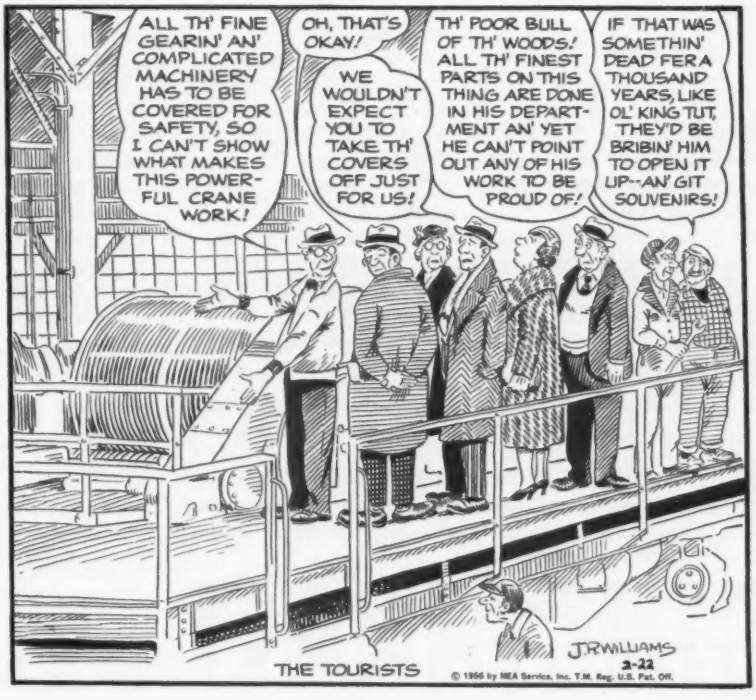
The Canadian workers also get eight paid holidays instead of the usual six. Nightshift employees will receive an increase of 5 pct of base pay for second shift work and 10 pct for third shift.

Slow 1956 Start

Considerable work has to be done by GM before it can start production on its 1956 models in Canada. The corporation plans to work on a 24-hour basis in order to get into production as early as possible.

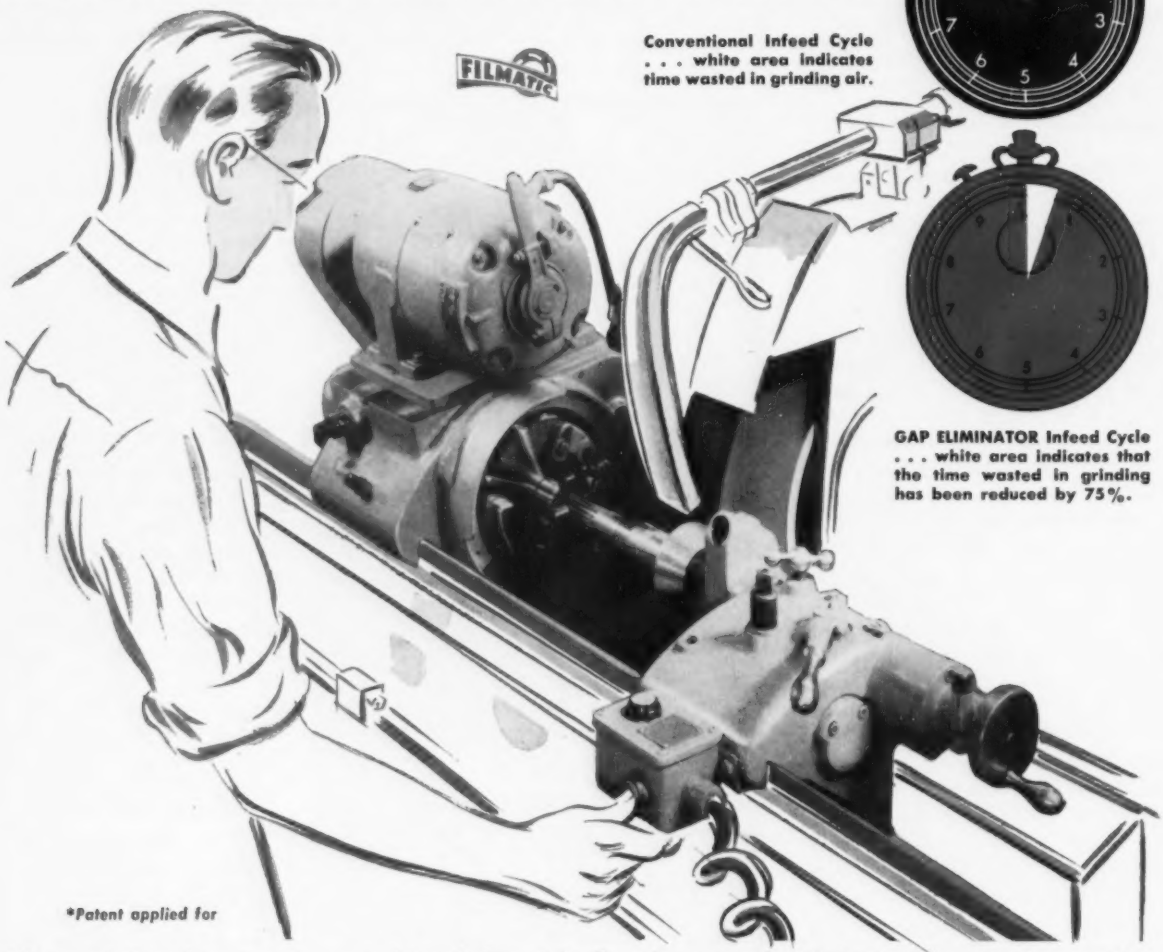
GM produces approximately 250,000 cars a year in Canada and the economic impact of the strike will be felt for many months after production returns to normal.

THE BULL OF THE WOODS — By J. R. Williams


ALL TH' FINE GEARIN' AN' COMPLICATED MACHINERY HAS TO BE COVERED FOR SAFETY, SO I CAN'T SHOW WHAT MAKES THIS POWERFUL CRANE WORK!
OH, THAT'S OKAY!
WE WOULDN'T EXPECT YOU TO TAKE TH' COVERS OFF JUST FOR US!
TH' POOR BULL OF TH' WOODS! ALL TH' FINEST PARTS ON THIS THING ARE DONE IN HIS DEPARTMENT AN' YET HE CAN'T POINT OUT ANY OF HIS WORK TO BE PROUD OF!
IF THAT WAS SOMETHIN' DEAD FER A THOUSAND YEARS, LIKE OL' KING TUT, THEY'D BE BRIBIN' HIM TO OPEN IT UP--AN' GIT SOUVENIRS!
THE TOURISTS
J.R.WILLIAMS 2-22
© 1956 by NEA Service, Inc. T.M. Reg. U.S. Pat. Off.

Gap Eliminator*

Gets the Wheel to Work *ahead of Schedule*



Conventional Infeed Cycle . . . white area indicates time wasted in grinding air.

GAP ELIMINATOR Infeed Cycle . . . white area indicates that the time wasted in grinding has been reduced by 75%.

*Patent applied for

How much time does your shop spend in grinding air? Too much, you can be sure, but it's not the fault of the workmen, for a certain amount of "cutting air" is a necessary evil in many machining operations. ¶ Cincinnati Grinding Engineers decided to do something about the time lost in grinding air during automatic infeed grinding cycles and developed the GAP ELIMINATOR, a new feature which may be built-in at the factory on automatic infeed machines. Briefly, here's how it works:

> The wheelhead advances toward the work at a rapid rate. At a predetermined point (grinding stock on radius + .001") the rapid rate changes to a fast feed rate. Instantly upon contact of the wheel and work, the normal grinding rate takes over, and the cycle continues to completion.

For the example illustrated, the resulting saving amounted to 75% of the time spent in grinding air and 25.8% of the total cycle time. ¶ Time savings like this can mean big dollar savings on the cost records. It will pay the management of every metalworking shop concerned with precision grinding to find out more about the GAP ELIMINATOR feature available for CINCINNATI FILMATIC Grinders. Write for literature.

CINCINNATI GRINDERS INCORPORATED
CINCINNATI 9, OHIO

GAP ELIMINATOR may be combined with Push-button Automatic Infeed and other cost-reducing features on CINCINNATI® FILMATIC Grinding Machines like the 10" x 18" size illustrated at right. You can obtain complete information by writing for publications No. G-660 and G-661.

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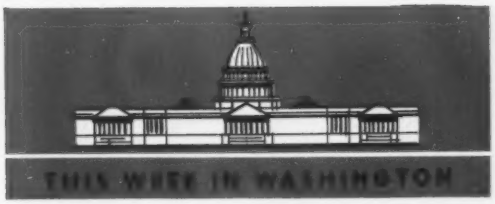


World Copper Buys Worry Military

Military officials show increasing concern over Russia's step up in copper purchases via Britain . . . Communists pay premium prices to keep guided missile program rolling . . . Airlines need longer runways—*By G. H. Baker.*

◆ MILITARY OFFICIALS are pointing with alarm to Russia's big increases in her off-shore purchases of copper, but the White House says it is not planning to clamp down on shipments of copper from the U. S.

Actually, this country ships little or no copper or copper wire to the Communists, but we do ship sizeable tonnages to the British, who then tranship to the Soviet Union.

In the latest 12-month period for which data on shipments are available (August 1954-August 1955), Communist nations imported from Britain about $15 million worth of copper wire. What the Reds really wanted was copper ingot, but this was not available in large quantities so they settled for higher-priced copper wire and are melting it down.

The U. S. State Department takes the position that the U. S. should not question British dealings with the Communists.

At the Pentagon, it is pointed out that Russia's big build-up in guided missiles follows very closely her big jump ("get it at any price") in purchases of copper wire.

The many electrical circuits contained in every guided missile all require copper wiring and contacts.

Says one general: "Every pound of copper that the Soviets can buy outside their borders means that another pound of domestic copper is released for some other type of Soviet military or industrial activity."

Even with the Reds paying premium prices to the British for this copper wire, it is clear that the Soviets are able to pick up millions of pounds of copper wire that otherwise would not be available. It is estimated that Britain has shipped about 200 million lb of copper wire to Red countries since August, 1954.

Runway Problems . . . "We need longer runways," the commercial airlines keep telling municipal airports. This means buying additional real estate at high prices, buying thousands of yards of steel-reinforced concrete strips, and installing extra signalling equipment.

Now one of the top aviation experts (Gen. Milton W. Arnold, of the Air Transport Assn.) says this runway problem is going to vanish in the next 20 to 30 years. Nearly all planes of the future will be jets that can take off and land almost vertically, he predicts.

Short take-offs and landings will be common in the future, although speed capabilities will increase. Pogo-stick arrivals and departures not only will spell out the salvation of many existing (but crowded) airports, but they may also usher in an era of smaller commercial airports located close to the business and industrial sections of larger cities where convenience is important.

Trade Note . . . The Eisenhower Administration serves notice on Congress that it intends to continue aiding the United Kingdom, Denmark and Italy this year, even though these three nations shipped goods to Communist countries last year.

(Under the Battle Act, Congress demands to be notified of intentions to aid nations that ship industrial goods to Communist countries.)

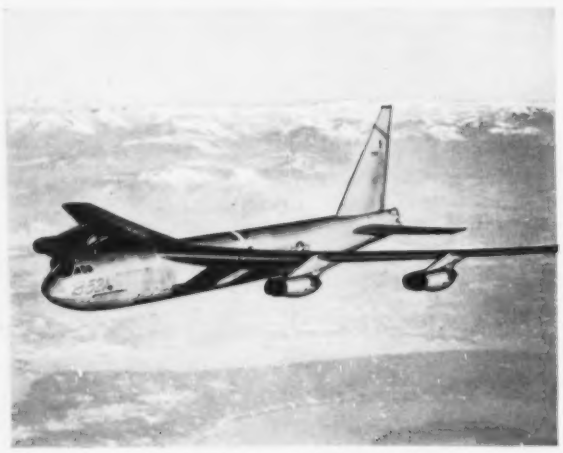
The Administration says none of the $282,977 worth of machinery shipped to the Reds included arms or ammo for arms buildup.

Seeing Isn't Always Believing

▪ Members of AFL-CIO unions are being warned against an industrial display called "Americade," which is now touring the nation under auspices of the National Association of Manufacturers. The AFL-CIO says "Americade" emphasizes the need for investment and profits in manufacturing industries and is silent about labor unions and the tax reduction for lower income families.

▪ ("Americade" shows in pictures and displays what life in the U. S. will be like in 1975. It cites the coming needs for expansion capital.)

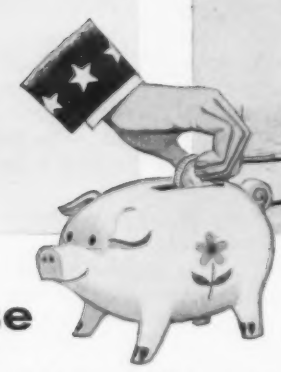
"Nautilus" Atomic Powered Submarine



Boeing B-52 "Stratofortress"

Convair F-102A Interceptor

Convair "Terrier" Surface-to-Air Missiles



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with "American" welded components

Let Amweld's Industrial Products Division study your problem in circular welded components. Better yet, send us your blueprints and then your production can be "well on its way with Amweld."

The taxpaying public usually pictures Uncle Sam as being a loose man with a dollar, busily throwing our cash away with both hands. American industry, serving the defense program, will tell you nothing can be farther from the truth. On the contrary, the Government is running for top honors for sharp-pencil buying.

Typical of the Government's conservation program is the wide acceptance of rolled and flash welded rings as the most economical way to produce circular weldments for jet aircraft engines, guided missile parts and many other products of our military defense program.

"Value Analysis" is fast becoming a part of American industry's buying procedure. For further information on ring applications write to:

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Portal-to-Portal Pay

Portal-to-portal pay, long a disputed point in labor-management relations, is now a firmly established industrial practice.

The U. S. Supreme Court, in two new rulings involving pay for performance of extra duties, has reaffirmed the principle of paying workers for time spent in walking, riding, traveling, washing up, or performing some other similar function directly related to employment.

Chief Justice Warren, in delivering the two new opinions (both unanimous) said it is clear that Congress intends to require compensation for time spent in changing clothes and taking showers (in the case of battery workers) or the sharpening and cleaning of knives (in the case of slaughter house employees).

John L. Lewis won an important decision for his United Mine Workers nearly 10 years ago when he obtained legislation providing pay for time spent by miners in walking, riding, or traveling in mine elevators to place of work.

Isotopes:

They're proving a big boon to industry.

New horizons are being revealed and millions of dollars saved for industry by radioactive isotopes, Atomic Energy Commissioner Willard Libby tells Congress.

Isotope use, he says, has cleared the way for development of many new plastics. He forecasts the creation of other novel materials as the byproducts of the atomic program are utilized more fully.

Industry now saves between $200 and $300 million a year with its applications of isotopes, and within 10 years these economies may amount to at least $1 billion annually, Dr. Libby estimates. His prediction, he tells the Senate-House Committee on Atomic Energy, does not include the benefits of isotopes to medical research.

AEC Active

Before the committee, AEC Chairman Lewis Strauss says his agency expects to get applications soon from foreign countries interested in power reactors. The AEC, he testifies, is going into the nuclear power field vigorously.

Lack of adequate insurance protection, charges Rep. Price, D., Ill., may be keeping private industry from moving ahead faster with atomic power. He advocates hearings to look into the problems of insurance for privately-run A-power plants.

Harold Price, who directs the AEC civilian application division, says projects have not yet reached the stage where plant building can be started. Within a couple of months, he adds, AEC will issue construction permits for the projects of Consolidated Edison Co. of New York and the Commonwealth Edison Co.

Wanted:

Executives will be asked to learn U. S. job.

President Eisenhower is calling upon the nation's top 4000 industrial executives to sign up with the government as mobilization bosses.

In a new executive order creating what the White House calls the "National Defense Executive Reserve," Ike calls upon Federal Mobilization Director Arthur S. Flemming to recruit about 4000 key officials from business and industry.

Each man will be called upon, in turn, to serve for a limited time in a government job. He will then return to his regular employment, and will be carried on the government's roster of "Executive Reserve" officials. All of these "Executive Reserve" officials will be expected to jump into civilian mobilization jobs for the government in the event of an enemy attack.

Who Is Needed

The reservists will not be compelled to serve tours of active duty with the government if they choose not to do so.

Mr. Flemming is looking for qualified men in all branches of industry, with particular emphasis on executives and trained personnel in the following areas: automobiles, trucks, buses, railroads, airlines, telephone, telegraph, radio, television, newspapers, magazines, and all personnel managers with experience in dealing with manpower problems.

Business and Defense Services Administration, where about 30 industry officials are serving the government for six-month periods, has a list of about 200 available executives. It is making this list available to the ODM, but of course this is only a start on the much larger project of signing up 4000 executives.

Industry Skirts Atomic Hearings

▪ Failure of industry to accept an invitation of the Senate-House Committee on Atomic Energy to squawk about provisions and administration of the present atomic energy laws may kill any chance of revisions this year.

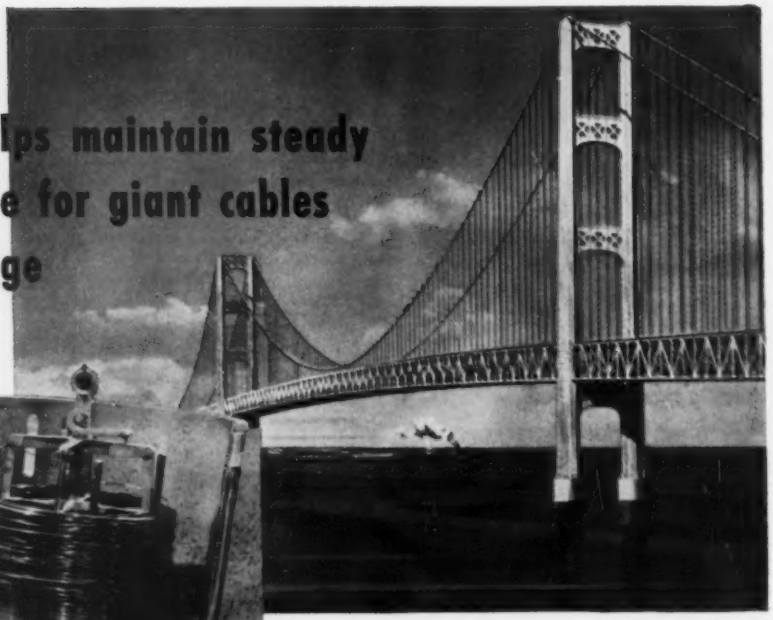
▪ Shortage of industry interest in the hearings is blamed on a number of reasons:

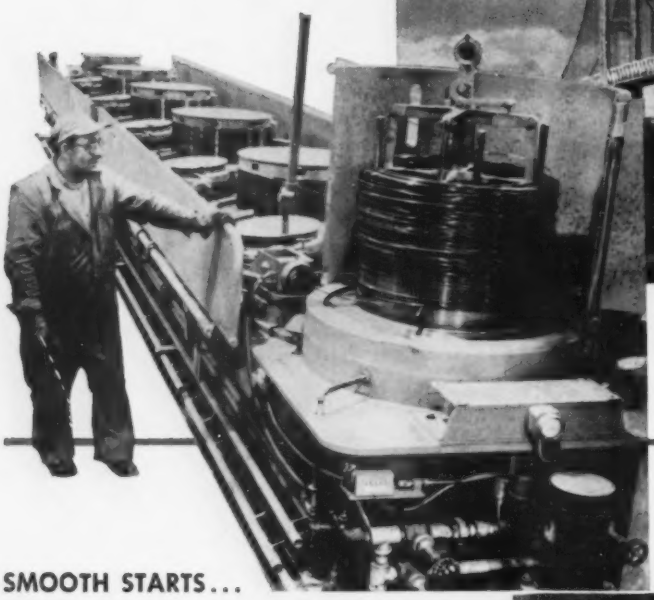
▪ Many firms invited are negotiating with AEC and don't want to criticize it at this stage of the game.

▪ The request to testify was too general, but industry would be glad to answer specific questions.

Industry doesn't want to appear just to gripe in public, and it will appear at later hearings on the report of a citizens' panel on the impact of peaceful uses of atomic energy.

EC&M Control helps maintain steady production of wire for giant cables on Mackinac Bridge

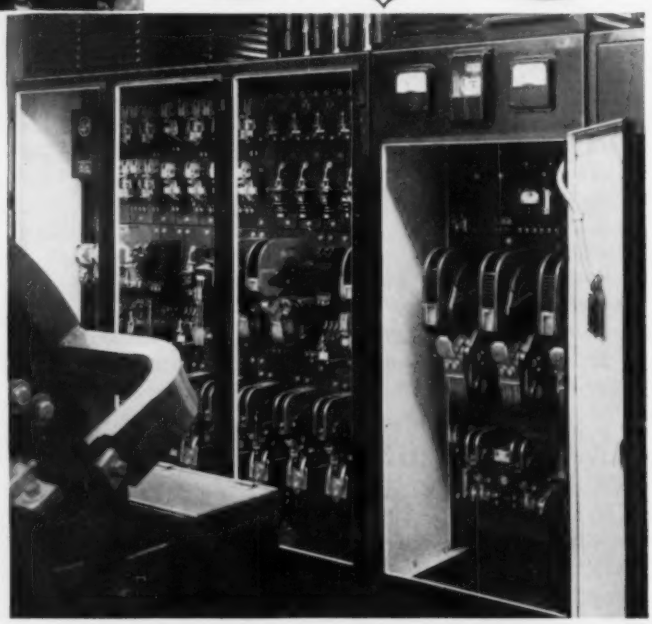




Bridge Drawing — Courtesy of Dr. D. B. Steinman, Cons. Engr. **Installation photos** — Courtesy of American Steel & Wire Division of U.S. Steel Corporation and Vaughn Machinery Co.

EC&M Wire block Controller (at left) for 60/75 HP, 500-1800 RPM, 230 Volt Motors. At right is 725 HP, 440 Volt Synchronous Motor Starter and Circuit Breaker Panel (with door closed) for 500 KW Generator.

SMOOTH STARTS... QUICK STOPS... WIRE IS DRAWN AT SPEEDS UP TO 700 FEET PER MINUTE



Mackinac Bridge, for connecting the two peninsulas of Michigan, will soon stand as a great link in our national highway system. Scheduled for completion in 1957, EC&M Control will have played an important role in this project by helping maintain a steady flow of 0.192" diameter wire to this important project. Wire is drawn from rods to make up the 2-ft. diameter suspension bridge cables. EC&M Control, *engineered* for the task, will have helped produce millions of feet of wire before the first auto crosses this outstanding highway link.

Ability to thread at slow speed, accelerate smoothly to continuous drawing speed, and quick-stopping when the reel is finished, a snarl develops or the wire breaks, are essential to good wire-drawing. Control for wire machines is custom built to the size and number of motors per machine and to the ever-increasing production-speed that is being required. Consult with EC&M whenever wire-drawing problems arise.

THE ELECTRIC CONTROLLER & MFG. CO.

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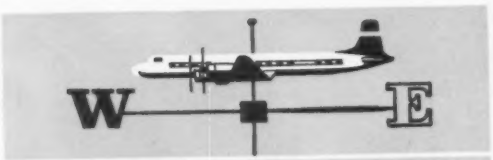

WEST COAST REPORT

Aircraft Unions Seek 35-Hour Week

West Coast aircraft workers will shortly drive for new hour-wage package . . . Labor's top brass figures now is the time to bargain for long-range benefits . . . Outcome could set pattern—By *R. R. Kay.*

◆ THIRTY - FIVE - HOUR work week? Organized labor here is all set for the big push in the aircraft industry. February 25 is N-Day. Negotiations will start for real. Outcome of this struggle will be felt throughout the U. S.

On N-Day, International Association of Machinists, one of the country's two chief aircraft unions, will demand for its 11,000 members working at the San Diego plant of Convair Div. of General Dynamics Corp., this dish of tea:

Here's the Package . . . (1) 35-hr week. (2) 10 pct wage hike. (3) Union shop. (4) Supplementary unemployment benefits—$2.25 per month for each year of service. (5) Nine holidays instead of six. (6) Severance pay and protection in the event of plant dispersals. (7) Longer vacations. (8) Hikes in shift differentials and in health and welfare coverage.

Of course, these union demands will spark plenty of back-and-forths across the bargaining table. Final package will look different.

Meanwhile, AFL - CIO United Auto Workers, together with IAM, is negotiating a new contract for some 45,000 workers at Douglas Aircraft Co. Similar demands are in the cards. Most all the major manufacturers are due for the treatment.

To make the issue more binding on the entire industry, both unions, former bitter rivals for members, have teamed up. They figure a solid front is their best bet. They claim a 175,000 membership in 20 California plants.

Move Is Long-Range . . . Labor's top brass is looking ahead and enjoying the view. Here's what they see: Boeing, Convair, Douglas, and Lockheed loaded with $1.7 billion in commercial airline orders promised for delivery over the next four years. And to top that, the companies have a multi-billion dollar military backlog for aircraft, missiles, and rockets.

More military business is on the way. Why? The U. S. is constantly being warned that Russian air output is reaching the danger point; and that the Reds have almost closed the air power gap.

Labor's heavy thinkers figure the pressure to meet commercial and military delivery dates will put the aircraft manufacturers in a mellow mood on the 35-hr week and the other demands. Union strategy: Now is the time. Aircraft profits are highest in history.

A knock - down - drag - out fight looms high on labor's horizon. Outcome of the West Coast battle can become the industry's pattern.

Aluminum Prospects Bright . . . Pacific Northwest aluminum industry is watching in eager beaver fashion as natural gas comes its way. Reduction plants stand to gain nicely when it's piped in.

To push things along, Washington is getting another 760 miles of main and lateral natural gas lines. Pacific Northwest Pipeline Corp. is putting up $40 million.

AMONG nation's most powerful vibration testing devices is this 9-ton electrodynamic vibration exciter in the Environmental laboratory at North American Aviation's Downey, Calif. plant. It has a rated force output of 12,500 lb and can simulate up to 45 times the force of gravity.

These modern machines are helping manufacturers win "Production Oscars"

Call on your nearest Kling distributor or visit our plant at your convenience and see first hand the machines that have been winning "Production Oscars" in "the best of companies." Let us show you all of the many features of these machines and give you actual instances of the time and labor savings, production increases, and product improvements that Kling Machines are effecting on such jobs as cutting, punching and shearing beams, channels, angles . . . shearing round or flat bars . . . rolling structural shapes . . . making special cuts like flanging . . . slitting and coping metals or milling beams and columns.

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Do Reds Threaten Machine Tool Market?

Russia makes big push at European shows . . . Demand for space a problem at London exposition . . . Russia dominates field in Eastern Europe shows . . . European backlogs dip—*By E. J. Egan, Jr.*

◆ RUSSIA and her satellite nations are out to give the free world some rough competition in the production and sale of machine tools. Latest Soviet five-year plan, which will run through 1960, aims to boost machine tool output there by 52 pct. A similar program in Czechoslovakia is geared to a 47 pct gain; another in Poland is designed to step up equipment production there by 44 pct.

Seriousness of the Communist bloc drive for new business is apparent in its anxiety to grab off exhibit space wherever possible. Not at all bashful about demanding an "in," the Russians are yelling for 5500 sq ft of the best display space at the International Machine Tool Exposition in London, June 22 to July 6.

Show Space Problem . . . Earlier word about this show was that all space was sold out to British, other West European, and U. S. builders. But now the Exposition's Board of Organization is reported to be considering the Russian demand. If the Board yields, earlier reservations will probably be scrambled, space cutbacks made. A decision is expected before the end of this month.

In its own backyard, Russia will dominate the equipment displays when the Leipzig (East Germany) Spring Fair comes up shortly. At this show, the Soviet exhibit will fill up 16,000 sq ft of floor space, compared with the 11,500 allocated for West German builders, and 7300 for British firms. Red China will show up here for the first time with lathes, drilling equipment and boring machines.

Builders Worry . . . Looking ahead to the autumn of 1957, there will be another European Machine Tool Show held in Paris at that time. The Russian bear and its cubs (Czechoslovakia, East Germany, Hungary and Poland) intend to arrive in force at this one. However, the Soviet Union will have to take third place in the floor area category, behind Britain and West Germany.

The stepped-up Communist drive for more machine tool export sales has Free European builders concerned, is the main agenda item at many of their conferences these days. Word from a recent meeting of West German builders at Dusseldorf is that pressure from the Eastern bloc will be "small to moderate in the near future," but could achieve "impetus of a serious nature after 1957."

Already this year, the Russian dominated countries have booked more machine tool business than they did in the entire first quarter of 1955. Business acumen of East German industrialists, for example, was demonstrated when they grabbed off a deal to build a huge new shipyard and drydock installation at Alexandria, Egypt. Moreover, they contracted to supply all the machine tools that will be needed to operate the facility.

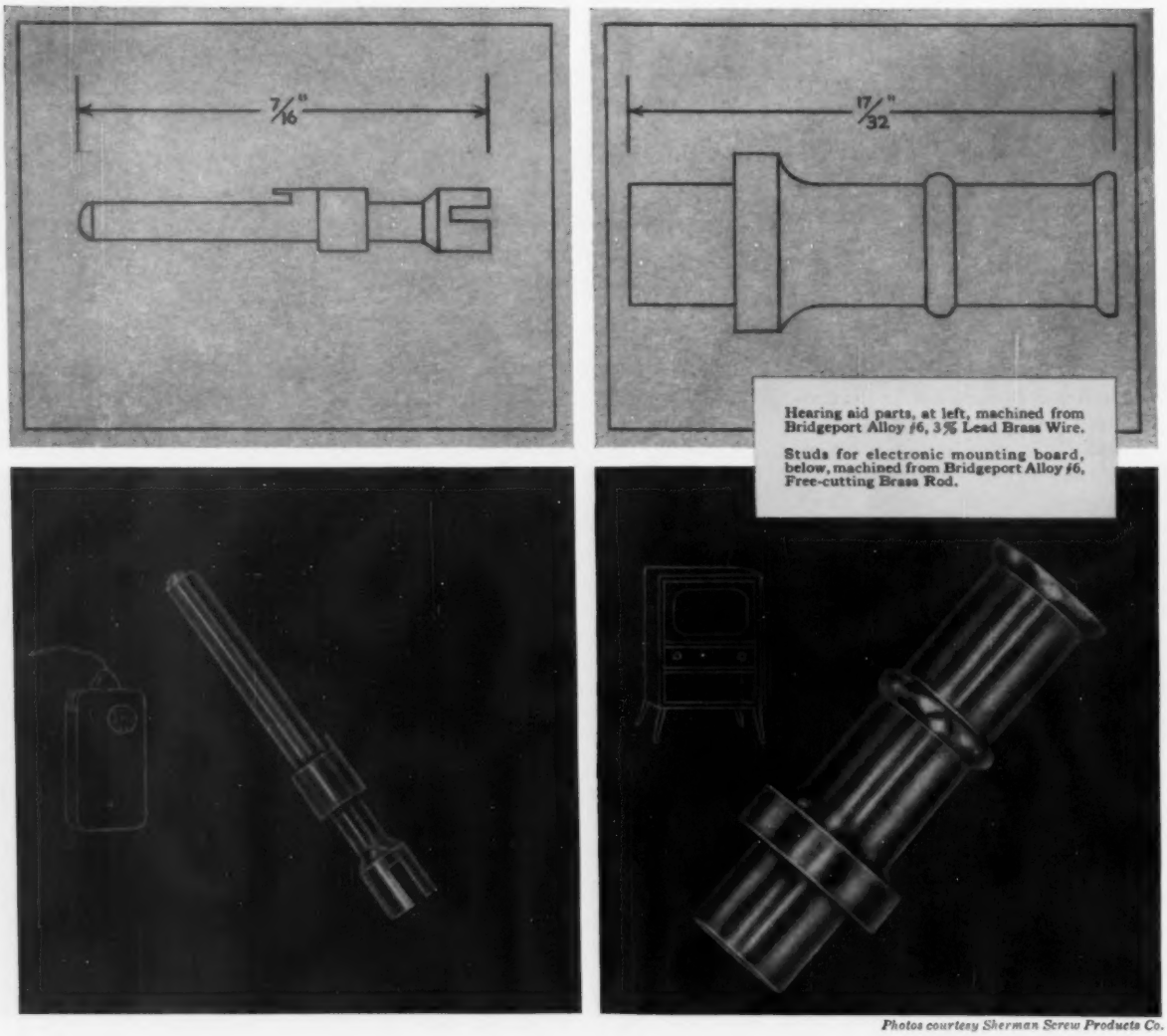
Prices Up . . . Meanwhile, builders in Western Europe aren't standing still, exactly. New orders to British, French, West German, Swiss and Italian firms did dip, generally, in November and December, 1955, and again last month. But backlogs for most machine tool types made over there still remain at healthy levels.

Prices for European-made metalworking machinery have edged up from 1 to 5 pct in the past year. Pressure comes from general upward trend in steel prices, wages (labor is scarce) and miscellaneous overhead items. Word is that machine tool prices would be up still more, but builders are afraid of scaring prospects away. They're cutting their own profits in order to hold the line as best they can.

Average Backlogs (Months) for European-Made Machine Tools

Type of Machine	West Germany	France	Italy	Switzerland
Boring	10-14	8-10	6-8	7-10
Turning	6-8	6-8	8-10	5-7
Drilling	12-14	8-10	10-12	9-11
Gear cutting	6-8	8-10	4-6	8-10
Milling	14-18	12-14	10-12	10-12
Honing	1-2	2-3	4-5	1-2
Hydraulic presses	4-6	6-8	8-10	8-10

Matching metal to job with Bridgeport alloys



Hearing aid parts, at left, machined from Bridgeport Alloy #6, 3% Lead Brass Wire.

Studs for electronic mounting board, below, machined from Bridgeport Alloy #6, Free-cutting Brass Rod.

Photos courtesy Sherman Screw Products Co.

Faster, easier, more accurate machining with Bridgeport HIGH I. Q.* Rod

Matching metal to job with Bridgeport Alloys can cut your production costs . . . increase your profits. To get the job done right, tell Bridgeport your production and service requirements—Our Technical Service will gladly help you select, from a complete range of High I. Q. alloys, the particular one that will serve you best. Call your Bridgeport sales office today.

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The Iron Age SALUTES

George V. Slottman His work with acetylene and oxygen has helped greatly in the understanding, application and production of these gasses and placed him in line for the industry's highest honor.

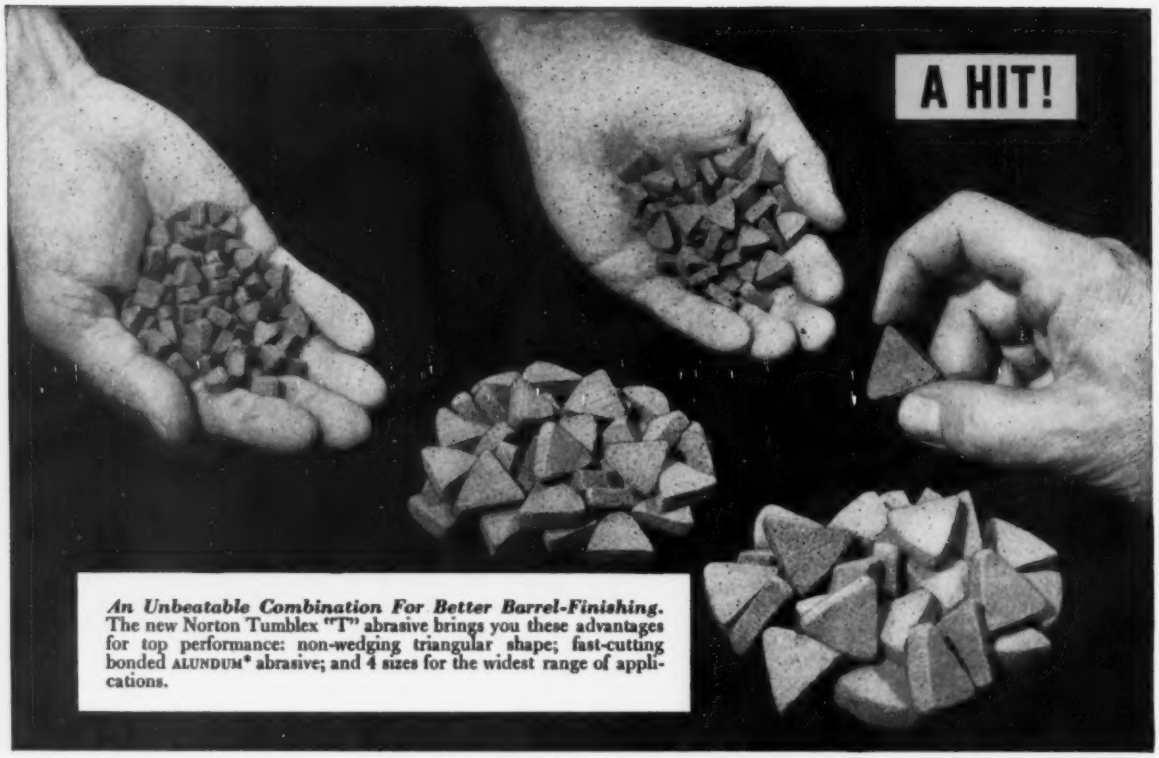
Top honor of the International Acetylene Assn., the Morehead Medal, will go to Airco's George Slottman this year. Action comes as a surprise to no one who produces or uses acetylene and oxygen for industrial purposes. Dr. Slottman's work with flames and gasses has paid off in benefits for nearly every phase of metalworking.

Vice president and director of research at Airco, he was one of the first to see the possibilities of oxygen as a purifying agent in steelmaking. At least fifteen years ago he began spicing up the heating flame and sticking pipes into the melt. Soundness of his ideas is seen from the fact that today oxygen is an important steelmaking element. Early in the game he came up with an analysis of oxy-acetylene fuel gas that gave theoretical backing to practical performance tests.

In World War II, Dr. Slottman was a leader in the push to put oxy-acetylene flames to work —cutting through production problems. He was in the thick of new developments in flame hardening, flame scarfing, flame cleaning and flame cutting. In the cutting and cleaning applications, his wartime role was particularly significant. More recently he furnished design guidance for the building of Airco's carbide and acetylene facilities at Calvert City, Ky.

Dr. Slottman came to Airco with a heavy background in combustion engineering. He did undergraduate, graduate, and teaching work at M.I.T.; directed a chemical engineering group at Bethlehem's Lackawanna plant during his faculty days. From 1930 to 1934, he was in England as chief combustion engineer and iron works manager for the United Steel Companies, Ltd., Sheffield. In 1934, he joined Airco. Prior to assuming his present post in 1952, he was manager of general technical sales; technical assistant to the vice president; and director of research and engineering.

Dr. Slottman is an enthusiastic fisherman, a heavy cigarette smoker, a competent writer (coauthor of "Oxygen Cutting"). Mrs. Slottman shares his interest in fishing.



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Users praise Norton TUMBLEX "T"

the new bonded, triangular tumbling abrasive

Reports prove Tumblex "T" abrasive brings many new

"TOUCH of GOLD" *benefits to barrel-finishing*

Here's one of the most revolutionary barrel-finishing innovations ever developed. In typical on-the-job tests, Norton customers report that the new Tumblex "T" tumbling abrasive:

- ***"cuts tumbling cycle time from five hours to one hour."***
- ***"finishes steel and magnesium parts that could never before be barrel-finished."***
- ***"completely removes burrs from stainless steel parts in four hours. Abrasives previously used failed to do so in 12 hours."***

Everything about Tumblex "T" abrasive is designed for better barrel-finishing.

Its uniform triangular shape and size prevents wedging in recesses of parts.

Made of famous Norton ALUNDUM abrasive, it cuts fast, with no compound needed — resulting in shorter time cycles and lower costs per piece finished.

It provides maximum surface contact with parts being processed, assuring top quality work in fastest time.

It wears down evenly, keeping the same triangular shape. No small chips to lodge in holes, slots, etc. — and when worn down it can be used on parts requiring a smaller size abrasive.

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The Iron Age INTRODUCES

Alexander P. Raeburn, elected treasurer, **Seymour Manufacturing Co.,** Seymour, Conn., **John D. Berwick, Jr.,** appointed general superintendent, Manufacturing Div.; **Stephen J. Zelle,** named chief engineer, Engineering and Maintenance Div.

Gaylord B. Barnes, appointed staff assistant to president, American Steel & Wire Div., **U. S. Steel Corp.,** Cleveland, **Howard C. Johnson,** appointed assistant to chairman, New York.

Melvin E. Bernhoft, named superintendent, service section, **Allis-Chalmers Manufacturing Co.,** Milwaukee; **William C. Harris, Jr.,** appointed application engineer, Switchgear Dept.; **Richard V. Petershack,** appointed application engineer, Control Dept.; **W. G. Williams, R. N. Gustafson,** appointed application engineers, Electrical Application Dept.; **Donald E. Mowe,** named sales representative, Washington, D. C., district office.

Charles A. Ott, appointed electrical superintendent, **Pittsburgh & Conneaut Dock Co.,** U. S. Steel Corp., Cleveland.

Charles J. Grey, appointed supervisor, Order and Scheduling Dept., **Wheeling Steel Corp.,** Martins Ferry, O.; **John W. Gallagher,** appointed chief production engineer; **Ben Cappelletti,** appointed labor foreman, Maintenance Dept.

Donald V. Van Gordon, appointed supervisor, ceramic sales, **Metal & Thermit Corp.,** New York.

Ernest J. Meuten, appointed divisional controller, Machine Tool, Cutting Tool and Gage Divisions, **Pratt & Whitney Co., Inc.,** West Hartford, Conn.; **Willard E. Ritter,** named divisional controller, Chandler-Evans Div.; **Henry J. Fredericks,** appointed company manager, financial accounting.

Victor M. Macha, appointed director, education and training, **Clark Controller Co.,** Cleveland; **Clarence Atkins,** named manager, Renewal Parts Div.; **W. R. Heckman,** named manager, Industry sales.

Norman S. Kornetz, appointed manager, engineering, Television-Radio Div., **Westinghouse Electric Corp.,** Metuchen, N. J.

T. D. Owens, appointed manager, foundry coke and pig iron sales, **Alan Wood Steel Co.,** Conshohocken, Pa.; **W. J. Patterson,** appointed manager, industrial coke and chemical sales.

Carl J. Murray, appointed plant manager, Wickwire Spencer Steel Div., **The Colorado Fuel & Iron Corp.,** Buffalo.

C. W. Mellette, appointed general sales manager, **Waterbury Mfg. Co.,** Waterbury, Conn.

E. R. JUNG, appointed vice president, marketing, Clark Controller Co., Cleveland.

ROBERT WHITEHILL, appointed general sales manager, Clark Controller Co., Cleveland.

REX D. CROSS, appointed vice president, sales, Laclede-Christy Div., H. K. Porter Co., Inc., St. Louis.

A. BAIRD HARRIS, appointed director, purchases, The Anaconda Co., New York.

W. H. Mouquin, named district manager, Chicago office, **De Laval Steam Turbine Co.,** Trenton, N. J.; **C. C. Bray,** appointed regional sales supervisor, Chicago office, Forest Park, Ill.

Herbert Wignall, named parts and service manager, **Link-Belt Speeder Corp.,** Cedar Rapids, Iowa.

Willis J. Keenan, appointed district sales manager, Bolt and Chain Div., **Republic Steel Corp.,** New York; other district sales managers appointed were: **Leonard D. Woods,** Los Angeles; **Vincent D. Shewell,** Birmingham, Ala.; **Jack D. Cavan,** San Francisco; **George E. Lustic,** Detroit; **Richard E. Wagner,** Cleveland; **Thomas F. West,** Chicago.

Arthur F. Norling, named assistant credit manager, **Chase Brass & Copper Co.,** Waterbury, Conn.

Charles A. Church, named manager, communication, engineering services, **General Electric Co.,** New York; **Paul R. Bosel,** appointed manager, credit and collections, Carboloy Dept., Detroit; **L. Z. Budzen,** appointed specialist, mining sales, Detroit.

Martin J. Hughes, appointed mine manager, iron ore mining operations, **Kaiser Steel Corp.,** Eagle Mt., Riverside County, Calif.

Robert Lea, appointed district manager, **Chase Brass & Copper Co.,** Indianapolis, Ind.

J. P. Van Duyne, appointed manager, engineering sub-division, Television-radio Div., **Westinghouse Electric Corp.,** Metuchen, N. J.; **O. H. Fernald,** appointed supervising engineer, color television engineering; **A. S. Goldsmith,** appointed supervising engineer, radio engineering.

RALPH R. BROWN, appointed works manager, Selas Corp. of America, Dresher, Pa.

CHARLES S. HEMPELMAN, named market analyst, Le Roi Div., Westinghouse Air Brake Co., Milwaukee.

RICHARD KIMMEL, appointed administrative assistant to vice president, Cyclone Fence Dept., American Steel & Wire Div., Cleveland.

THEODORE R. LEGLER, appointed assistant superintendent, construction, The Youngstown Sheet and Tube Co., East Chicago.

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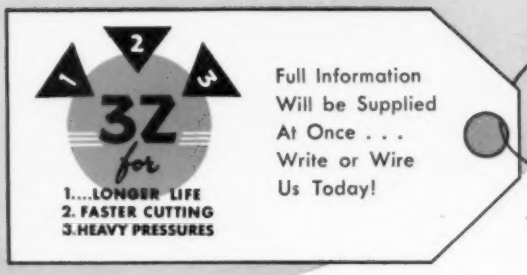
PENINSULAR ANNOUNCES ITS NEW "3Z" WHEEL

FIVE YEARS RESEARCH CREATES NEW STANDARDS FOR SLAB, BILLET AND HEAVY DUTY GRINDING



Peninsular's "3Z" Grinding Wheel, just introduced, is an entirely new concept in maximum density abrasive tools. Although the New "3Z" Wheel provides the closest possible approach to zero porosity, it gives free-cutting performance—combines the economy of faster grinding action with the longer life offered by such extra-dense structure.

This New "3Z" Wheel is packed full of specially selected, tough abrasive grains. These are held in an unusual bond, developed after a five-year research program and tested for months. As a result, you can now expect much more metal removal per minute than ever before—all this from a cooler, easier-handling unit! Peninsular abrasive engineers will gladly demonstrate the New "3Z" Wheel on any of your billet and other heavy duty grinding jobs.

PENINSULAR SINCE 1889

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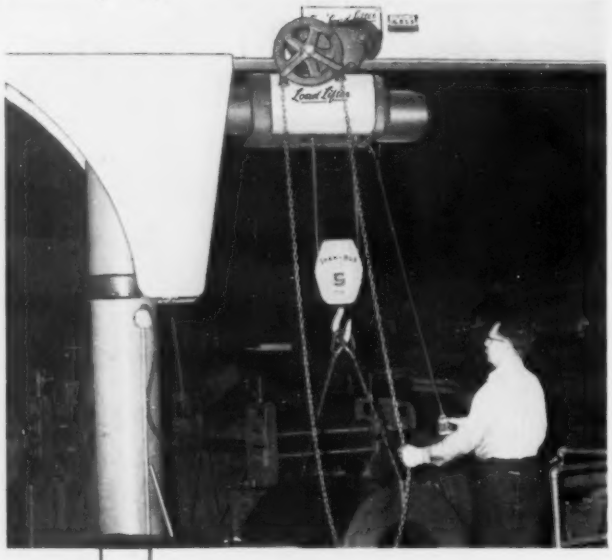

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H. Stanley Butterworth, appointed assistant general manager, Container Div., **Jones & Laughlin Steel Corp.,** New York; **Dr. A. W. Gessner, Earle F. Young, Jr.,** appointed process engineer, chemical engineering services; **Dr. H. N. Lander,** named development engineer, process metallurgy.

Vince Tassi, appointed industrial manager, **Minneapolis-Honeywell Regulator Co.,** Hartford, Conn; **Lyle Russell,** appointed industrial manager, Chicago.

R. W. Titgemeyer, appointed assistant branch manager, Los Angeles territory, **The Carpenter Steel Co.,** Reading, Pa.

David J. Fraade, appointed sales specialist, process-control instrumentation, **Consolidated Electrodynamics Corp.,** Pasadena, Calif.

William H. Treffinger, named manager, Morrison plant, Herman Nelson Div., **American Air Filter Co., Inc.,** Morrison, Ill.

Clifford R. Kral, appointed production manager, Machine Div., **The Torrington Manufacturing Co.,** Torrington, Conn.

William T. Richie, named general foreman, Machinery Div., **Pratt & Whitney Co.,** West Hartford, Conn.; **Dominic Ricardo,** named head, Milling Dept.

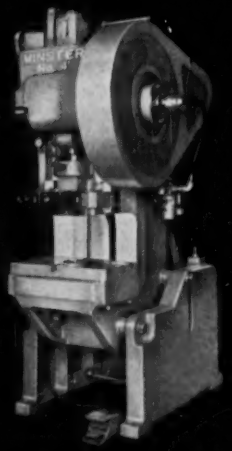
H. E. Hanley, named sales engineer and assistant to district manager, Chicago, **Transue & Williams Steel Forging Corp.,** Chicago.

John A. Gudzinas, appointed purchasing agent, **Mannesmann-Meer Engineering and Construction Co.,** Easton, Pa.

Jay Miller, appointed sales representative, metal processing chemicals, **Pennsylvania Salt Mfg. Co.,** Philadelphia.

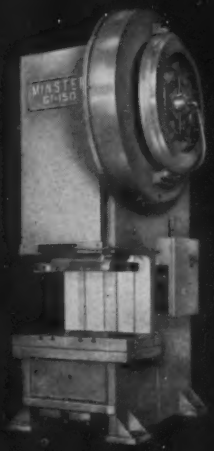
MINSTER PRESSES

mean less die repair, less scrap, less down time

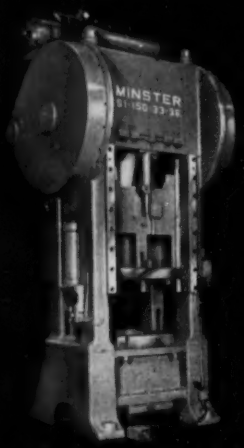


Open Back Inclinable Presses
12 tons through 200 tons

Straight Side Two Point Presses
50 tons through 500 tons



Fixed Base Single Point Presses
32 tons through 200 tons



Straight Side Single Point Presses
50 tons through 600 tons

Piece-Maker Automatic Presses
20 tons through 200 tons

Knuckle Joint Embossing Presses
150 tons through 1500 tons

Minster Press Lines not shown above:
Two Point Gap Presses inclinable or Fixed Base, 22 tons through 75 tons
Horning Presses, 12 tons through 95 tons.

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NOW! Weld even mild and

developed by A. O. Smith

medium carbon steels automatically...

new gas-shielded metal arc process uses Carbon Dioxide to shield the arc

ON GAS ALONE **in one year's time (3 shifts per day, 260 days), a single C-OMATIC unit saves you *$14,902.00 over Argon, $15,367.00 over Helium.***

● **NEW ECONOMY** thanks to use of less-costly Carbon Dioxide . . . thanks to low maintenance requirements of functional design.

● **X-RAY QUALITY WELDS** — Strength and ductility — yours with C-OMATIC.

● **VISIBLE ARC** means faster, easier welding . . . quick, convenient spotting of nozzle. (When required, C-OMATIC is easily convertible to submerged arc, too.)

● **DEEP PENETRATION** further assures high quality welds. No slag to remove . . . no flux to clean up.

● **ACCURATE CONTROL SYSTEM** of constant current design maintains preset arc voltage without fluctuation. No complex electronic circuits! Auxiliary controls available.

● **POWER SOURCE** — The service-proved A. O. Smith d-c rectifier.

Chart illustrates astonishing savings

	HELIUM	C-OMATIC	YOUR SAVINGS		ARGON	C-OMATIC	YOUR SAVINGS
Gas consumption per hour	70 cu. ft.	30 cu. ft.	40 cu. ft.	Gas consumption per hour	60 cu. ft.	30 cu. ft.	30 cu. ft.
Cost of gas per cu. ft.	$0.067	$0.01	$0.057	Cost of gas per cu. ft.	$0.09	$0.01	$0.08
Cost of gas per hour	$4.69	$0.30	$4.39	Cost of gas per hour	$5.40	$0.30	$5.10
Cost per hour 60% of duty cycle	$2.81	$0.18	$2.63	Cost per hour 50% of duty cycle	$2.70	$0.15	$2.55
Cost per day (3 shifts, 22.5 hours)	$63.20	$4.05	$59.15	Cost per day (3 shifts, 22.5 hours)	$60.80	$3.38	$57.42
Cost per year (260 days)	$16,420	$1,053	**$15,367**	Cost per year (260 days)	$15,780	$878	**$14,902**

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Welding Products Division, A. O. Smith Corporation, Milwaukee 1, Wisconsin.

See C-OMATIC in action at the National Metals Exposition in Philadelphia... October 17 to 21... Booth 1842.

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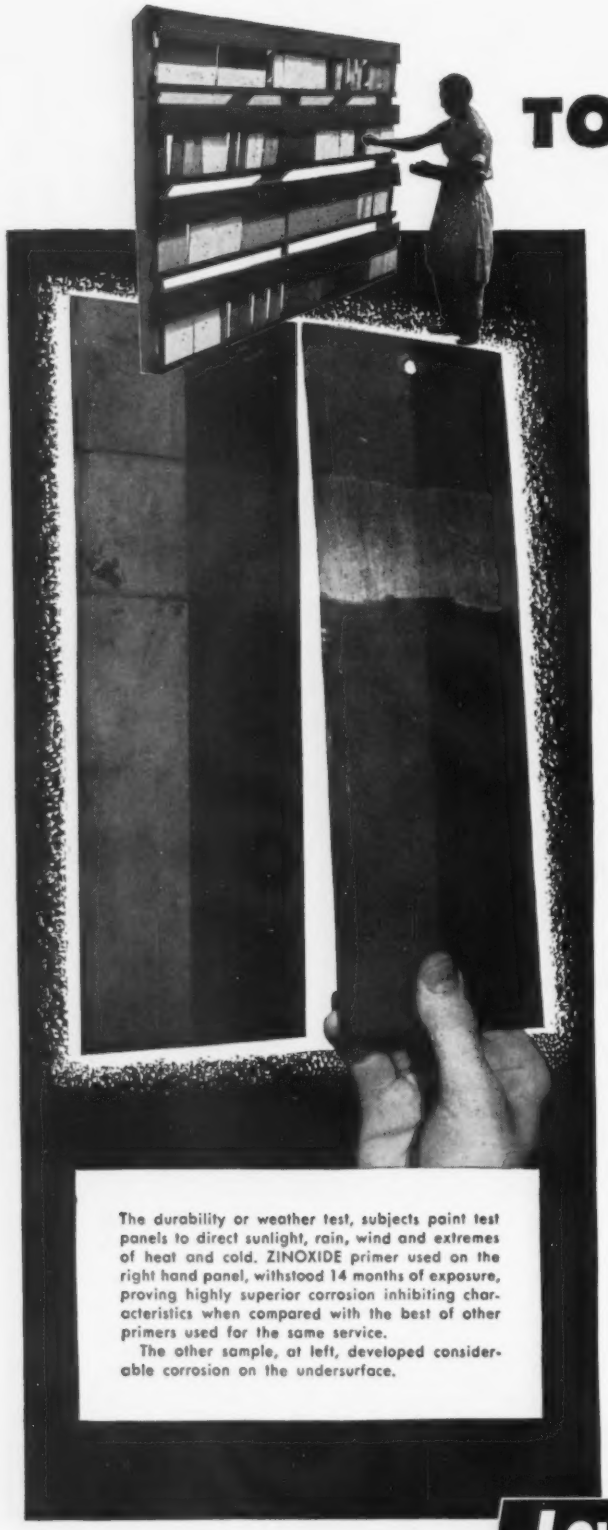

The durability or weather test, subjects paint test panels to direct sunlight, rain, wind and extremes of heat and cold. ZINOXIDE primer used on the right hand panel, withstood 14 months of exposure, proving highly superior corrosion inhibiting characteristics when compared with the best of other primers used for the same service.

The other sample, at left, developed considerable corrosion on the undersurface.

TORTURE RACK for finishes

...helps improve industrial primers

The old saying, "proof of the pudding is in the eating" describes the durability tests employed at Lowe Brothers. Conditions closely duplicating those in actual service are a vital part of testing all new finishes as well as the continual improvement of existing products.

A recent product development program carried out by our Technical Department is a good example.

Extensive tests were made on many types of pigment materials to develop a superior industrial primer. The result—ZINOXIDE—a primer with highly superior corrosion inhibiting properties ideal for the surface protection of forgings, castings and sheet steel products.

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INDUSTRIAL FINISHES

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FEATURE ARTICLES

Saves handling too—

Transfer Machine Makes Crankshafts Initially Straight

◆ "Rough machining" doesn't necessarily mean inaccurate work . . . Example: A four-station automatic transfer unit at Chevrolet does a very accurate job on initial machining of crankshaft forgings . . . By so doing, it helps eliminate costly straightening operations.

◆ The new machine also saves considerable part handling, thereby cuts production costs still more . . . Automatic clamps, good fixturing solve part-location problems . . . Chip buildup is avoided by having cuttings drop through the machine to a conveyor.

By W. G. PATTON, Engineering Editor

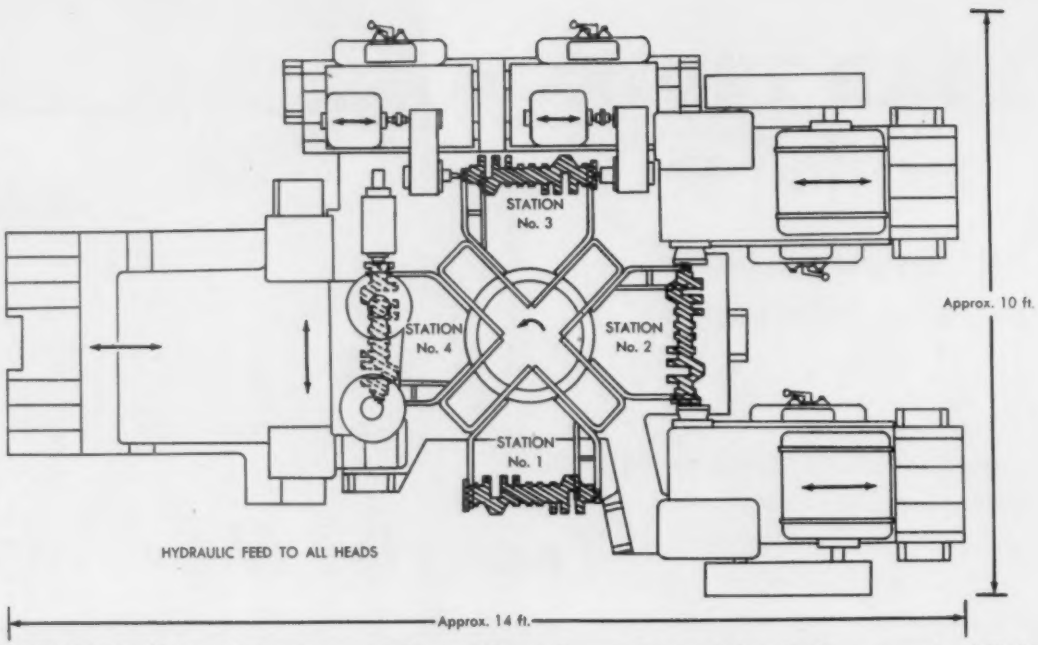
◆ CRANKSHAFTS produced at the Chevrolet-Flint V-8 Engine Plant do not require straightening. Close control of initial drop forge operations plus unusual accuracy in milling to length, center drilling and notching for locating make it possible to eliminate straightening after forging or machining operations. In addition to reducing cost, omission of straightening eliminates the possibility of introducing unfavorable stresses by such treatment.

A key to the firm's ability to produce initially-straight steel crankshafts is a new four-station, rotary type Kearney & Trecker transfer machine. It mills the crankshaft to length, then center drills and notches the part prior to final turning, grinding and balancing. Normally, three separate machines might be required to complete this series of operations. Any slight warpage that may be present in the "as forged" shaft is eliminated during machining.

In addition to meeting very high production requirements, the K & T rotary machine also provides automatic transfer. Moreover, it brings the crankshaft within 5 in.-oz of balance, leaving enough metal at the right locations to permit finish machining and final balancing.

Units on common base

Basic features of the new milling, drilling and notching machine include a central transfer unit and one drilling and two milling units attached to a common base. Automatic clamping



COMPACT, efficient design of new machine yields high production per unit of floor area. Loading and unloading is done at Station No. 1. No. 2 mills ends to proper length; they are center-drilled at No. 3. At Station No. 4, locating notches are milled on each shaft.

"Use of the machine may point to other opportunities to eliminate unnecessary handling."

and locating fixtures are also attached to the machine base as shown in the accompanying diagram.

To supply the machine, forged crankshafts weighing about 65 lb each are brought to the tool site by overhead conveyor. At the proper time, the machine operator removes a single shaft from the conveyor with the assistance of a hoist and a hook. The crankshaft is then placed at the No. 1 station which serves for both loading and unloading.

Assures positive positioning

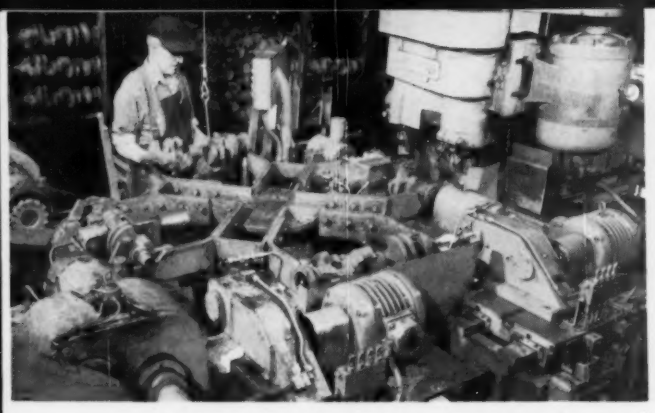
As indicated in the diagram, an auxiliary arm is attached to one of the transfer cradle arms to assist in locating the crankshaft radially in the proper position.

Positive positioning of the cradle is assured by a tapered rod on the machined base which locates into one of four accurately drilled holes on the transfer mechanism. These holes have hardened, inserted bushings.

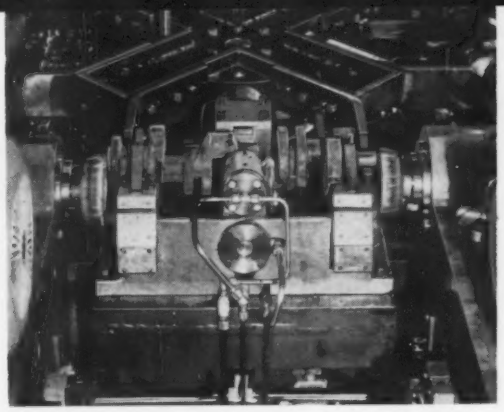
The transfer unit includes a hydraulic lift mechanism and has four sets of arms. The arms are notched as shown to hold the crankshaft. After each machining cycle, the transfer unit lifts all four crankshafts simultaneously to a height sufficient to clear all machine members. The parts then rotate automatically to the next station where they are lowered into position and clamped automatically.

At Station No. 2 the crankshaft locates laterally against the center throw. The part is lowered by the transfer unit between "V" openings and clamped automatically. Two feed slides, each equipped with one horizontal head, comprise the first milling unit. The crankshaft is milled without lubrication by 6 in. diam, fine pitch carbide cutters. Cutter teeth are designed to produce short chips that break off readily and fall down through the base of the machine.

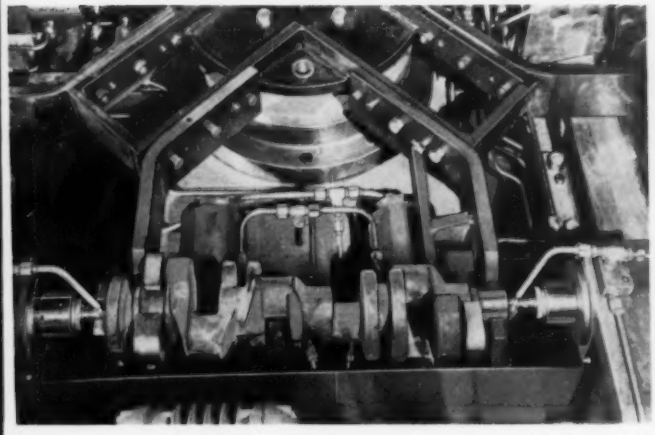
Cutters operate in the range of 300-340 sfpm. The left hand spindle is powered by a 10 hp motor; a 7½ hp motor drives the opposite spindle.



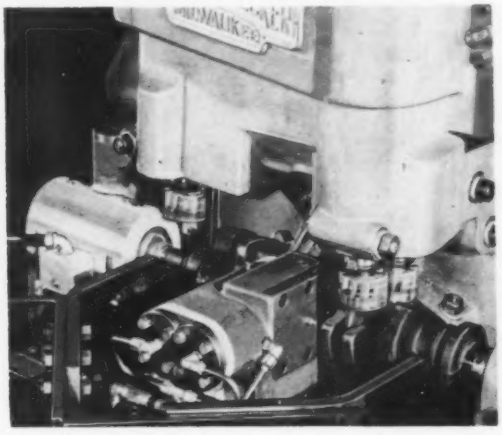
HOIST assists the machine operator to load and unload heavy crankshafts at Station No. 1.



FAST operation at No. 2 station mills shaft to length with 6-in. diam carbide cutters.



OPPOSED horizontal tools center drill the shaft ends simultaneously at the No. 3 station.



POSITIONING saddle at No. 4 station mounts a six-spindle head to mill locating notches.

At Station No. 3 the crankshaft is again lowered between "V" supports and clamped automatically. At this station the part locates laterally against a bumper plate. The station has two slide units, each equipped with a single spindle horizontal drilling head. Each head is powered by a 1-hp motor. One head is a reverse-type drilling unit; the other is standard. Depth of the center drilling operation is held within ±0.002 in.

Single head for final milling

The final operation, milling the locating notches, is performed at Station No. 4 where a single milling head is mounted on a positioning saddle. There are two horizontal, one angular and three vertical spindles. Four equalizing pins locate against No. 1 and No. 4 crank pins, assuring proper radial positioning.

The positioning saddle advances to a positive stop. The head then feeds approximately 4½ in. to the left, milling the seven locating notches required. An oil mist system provides lubrication for the spindle bearings. The piece is machined dry by six 3 in. x 1¾ in. carbide shell end mills, each having 10 blades.

Axial adjustment of the spindles is provided at both of the machine's milling stations to compensate for cutter wear. Hardened and ground ways are used throughout the machine.

Crankshafts are machined at 21-29 Rockwell C hardness. Chips fall by gravity through openings in the machine. The chips do not tend to cling to the machine and are easily brushed aside by the operator if they do begin to accumulate. An under-the-floor conveyor carries the chips to a nearby crusher.

The machine has been designed for automatic loading, if desired.

Successful use of this transfer machine by Chevrolet is expected to point to further opportunities for the firm to eliminate unnecessary handling of steel parts during machining operations. Thus far, such problems as locating the parts and clearing away chips have tended to minimize the use of this type of equipment for automatically transferring steel parts between machining operations.

Compactness of the machine is considered one of its significant features. Through efficient design, the machine is capable of yielding high production per unit of floor space.

Handles heavier strip—

Continuous Line Stamps, Welds Housings Faster

◆ Improving a production setup often goes hand in hand with a design change . . . Buick demonstrates this with its new, integrated stamping and welding line . . . Work flow now is continuous, with production at 120 housings hourly.

◆ In the thicker housing design, use of 0.180-in. coil stock is practical, even though housings earlier were drawn from 0.156-in. sheet . . . Joining housing halves with four simultaneous butt-welds helps boost output to 120 hourly.

By HERBERT CHASE, Consultant, Forest Hills, N. Y.

◆ REDESIGN of part or product often presents opportunities for improving production facilities. Buick Motor Div., General Motors plant at Flint, Mich. had this chance and took advantage of it. In revamping a production setup to accommodate 0.180-in. thick sheet steel required in a new housing design, Buick found it possible to shift to less costly and more easily handled coil stock.

Now work flow is continuous, automated from coil reel through blanking and drawing steps to a quadruple seam, butt-welding operation joining sheet metal housing halves at the rate of 120 an hour. In addition to higher output, the new installation shows marked savings in handling time and labor.

Two flanged end fittings were joined to the housing earlier by butt-type circumferential automatic arc welds. Present flanges have tubular hubs that telescope over axle ends and are joined to the housing by circumferential fillet-type arc welds, also produced automatically. End fittings previously required a hot forging operation on the tubular hubs after cold drawing had been completed. Redesigned flanged fittings are currently finished by cold drawing.

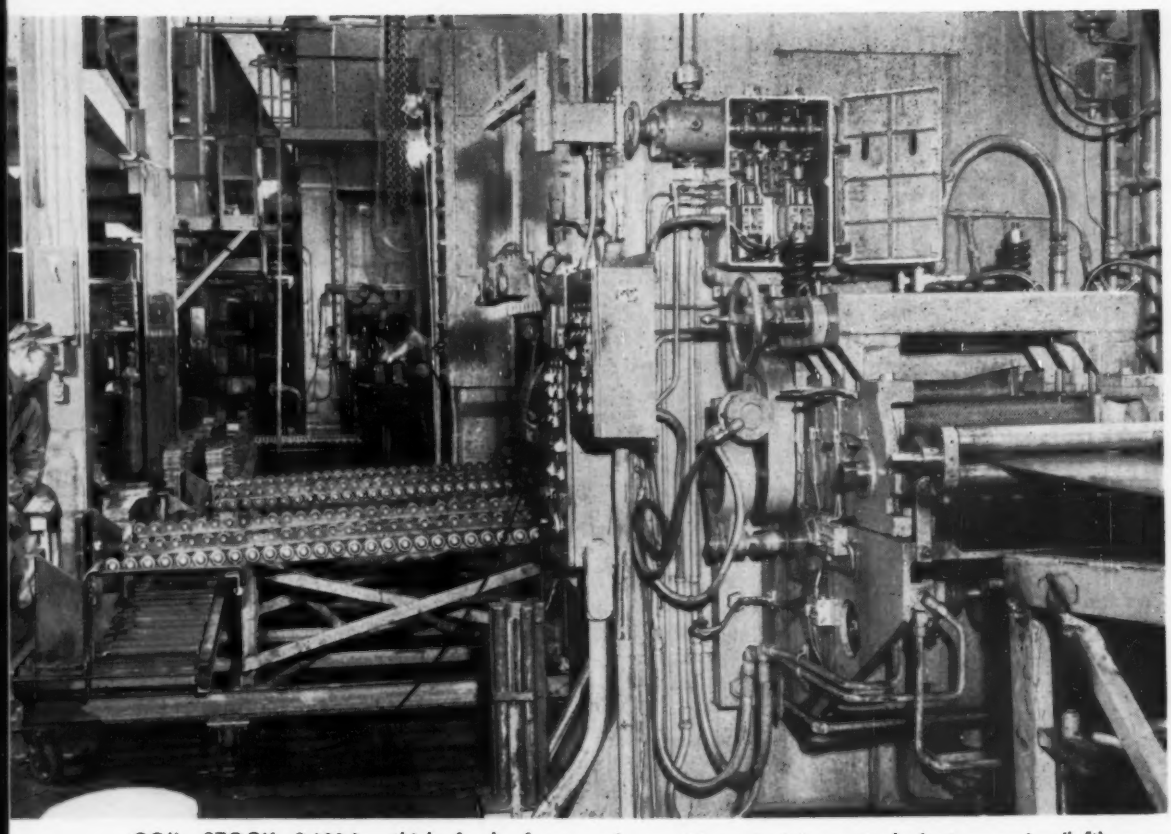
Virtually new, heavy press equipment is employed on the housing line. Recently purchased automatic machines for longitudinal welding continue in use with slight modifications. New machines of the same type have been added. All welders are integrated into production lines for continuous flow through stamping and welding operations. Higher hourly output of completed housings is one result.

Horsepower increase in 1956 Buick cars necessitated redesign of rear axles and rear axle housings. Formerly housings were drawn from 0.156-in. thick sheet on two smaller models. Now 0.180-in., SAE 1008, commercial quality steel is used, purchased in coils 17¼ in. wide.

Blanked from heavy stock

In prior practice, blanks for half housings were stamped from sheet stock. In the new setup, 17¼ in. wide coil stock (unusual in so heavy a gage) is fed to a 1500-ton Clearing press equipped with intermittent feed and straightening rolls.

Blanks are nested side by side with axes parallel to the length of the strip. Edge trim allowance at each side of the strip is only ⅛ in. Wide



COIL STOCK 0.180-in. thick feeds from reel through straightening coils (right). Housing blanks (32 a minute) are stacked at magazine (left), move to stamping press in background.

center and narrow end sections of blanks necessitate cutting away considerable scrap. However, continuous coil length permits part layout for best stock utilization, more easily accomplished on strip than sheet. Much scrap is later recovered by forming into washers and shims.

Major portions of housings are drawn as before into two identical halves. But the banjo at the center, formerly circular, now is flattened into a nearly elliptical shape.

The blanking press makes 16 strokes a minute. Output is high for blanks so large and heavy: two blanks are cut out at each press stroke. Some stock cut away feeds out transversely from each side of the dies, as do the blanks. Remainder of scrap continues through the press longitudinally and is cut up as it leaves the Littel feed rolls. After waste is separated, blanks advance in stacks on a gravity roller conveyor to the next press, a 1000-ton Danly, running at 12 working strikes a minute.

Blanks are transferred there onto a feed rack and then into a magazine down which they move automatically into a five station transfer die. At the first die station, four corners of the central banjo section are bent up. In the second, the banjo flange is turned up 90°. In station three, flange angle is increased to 135°. At station four, the flange is folded flat against the blank.

These steps eliminate need for stiffening rings and associated forming and joining operations. Rigidity of the completed axle is greatly increased.

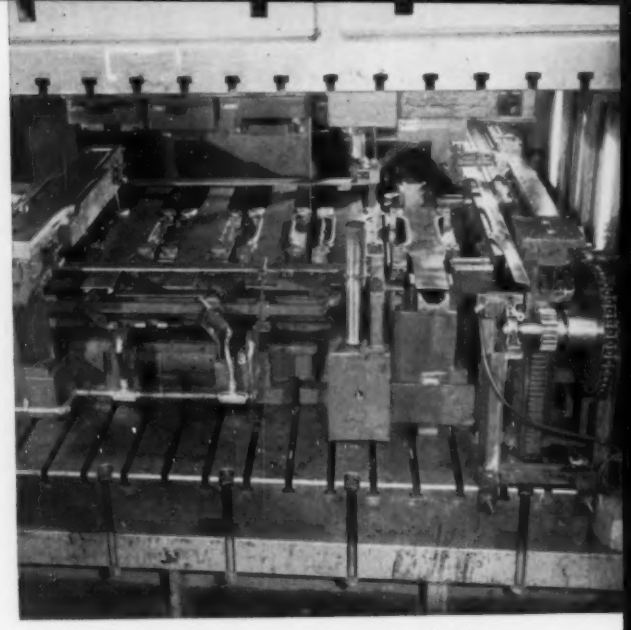
In the fifth station, the blank is formed to V-shape from end to end, which avoids cracking when the banjo is drawn in the next press.

Final drawing in three stations

After this operation, the blank is ejected from the die and transferred to the next press, a 2000-ton Cleveland synchronized with the preceeding press to run 12 working strokes a minute. There are three working stations in the press die, with automatic transfer through all three.

Major forming takes place in the first station where the half banjo is drawn to a semicircular shape and also is given its channel shaped section. Double-thickness flanges also are formed to a flattened arc shape. At the same time, both end sections are stamped to a half tube extending from the banjo.

"Restrike coins four housing edges for good fitup . . . Submerged arc longitudinal buttwelds join both halves simultaneously . . ."



FIVE-station transfer die rough forms blanks (l. to r.): housing corners turned up, banjo flange bent to 90°, flange angle increased to 135°, flange folded flat, preformed to V-shape.

Although this forming brings the work piece to substantially its final half-housing shape, the stamping must be restruck. This blow sizes the banjo and coins four edges that mate with opposite housing half.

When a pair of halves is placed in welding dies, edges are straight and flat to provide a good fitup. Without such a fitup, imperfect welds are likely to result. At the final station, ends are clamped and sheared to correct over-all length.

On ejection from this die, each half housing is removed by hand. After cleaning, every second stamping is pierced with a small hole in each half-tubular section. Subsequently, a sort of breather valve is inserted in each hole to relieve pressure caused by churning of the lubricant in service. Washing at 180°F follows to insure grease-free surfaces, essential for good welds.

Five Expert welders traverse along ways to produce four longitudinal welds simultaneously after housing halves are clamped for joining. Each machine is equipped with four Lincoln automatic welding heads. Flux to submerge the arcs feeds onto ledges just below the welds. Excess flux is recovered and reused.

One man removes half-housings from a chain conveyor and loads them in a welding machine. The previously-loaded duplicate machine runs through its automatic cycle simultaneously. Each machine welds 120 housings an hour.

Shears weld bead

Welded housings are hung on a chain conveyor for transfer to a Toledo press that shears off weld bead protruding above the tube surfaces.

Axle housings then slide down an incline to a 1000-ton Warco press that coins each end for a true cylindrical contour to fit flange hubs. This die flattens banjo faces and undercuts the housing to provide gear clearances adjacent to the face on which the carrier is later mounted. Shearing punches for these undercuts are cam operated and expand in cutting. They retract again to permit unloading of the housing.

Blanks for axle end flanges are produced from SAE 1008 hot-rolled plate, 80⅝ x 16⅝ x ⅜-in. thick. Pickled and oiled stock is deep drawing grade from which 39 blanks per plate are sheared at three per stroke. A 700-ton Clearing press is employed.

Blanks are pushed through the die and pass down a chute to a conveyor. Punches are staggered to yield a maximum number of blanks per strip. Scrap is sheared into bushings fed automatically into tote tubs.

Blanks are conveyed to a 1200-ton Verson Transmat press and loaded onto a dial magazine in which each recess holds 12 blanks. A suction pickup and magnetic device prevent pickup of more than one blank at a time. At pickup, the blank is shifted automatically and is deposited between the fingers of the die feeding mechanism.

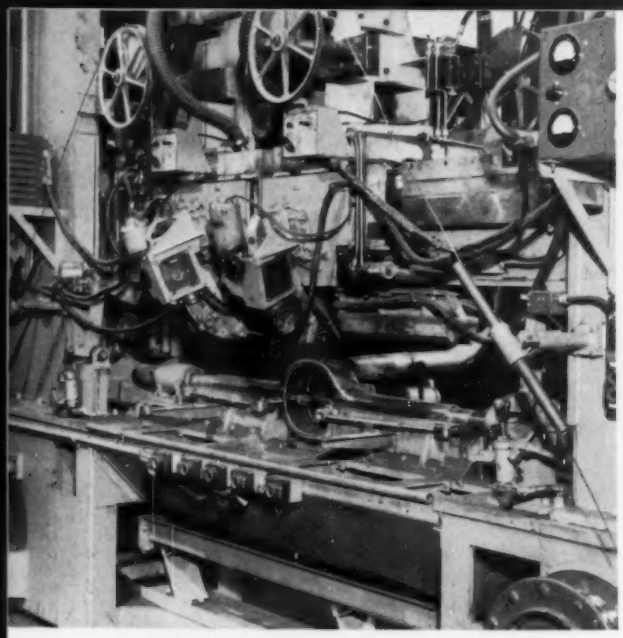
At the first die station, the blank is pierced dry and partly formed. In repiercing and reforming at the second station, the punch acts upward. A carbide punch acting from below extrudes the hub at the third station, forcing the metal into a hole in the die above. This die also forms an annular depression in the flange next to the hub. The fourth station is idle but at the fifth, dies flatten and coin the flange.

Presized hubs eliminate machining

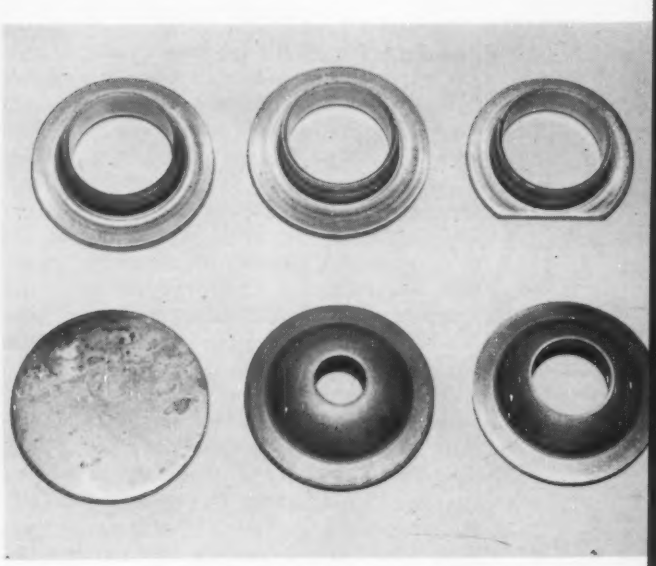
At the final station, the flange is trimmed, and a flat sheared on part of the periphery. This press operates at 18 working strokes a minute. Transfers are automatic, so the operator need only watch the die for proper functioning. A helper is needed to supply the feed magazine with blanks.

Flange hubs drawn on this press are sized to fit housing ends and do not require machining before welding in position. Flanges are cleansed before delivery to Agnew welding machines.

In welding flanges, electrodes are inclined at about 25° to produce fillet welds where the hub



FOUR longitudinal welds simultaneously join housing halves automatically at 120 an hour.



END FLANGES are cold drawn without lubricant in 1200-ton, 6-station, automatic transfer press.

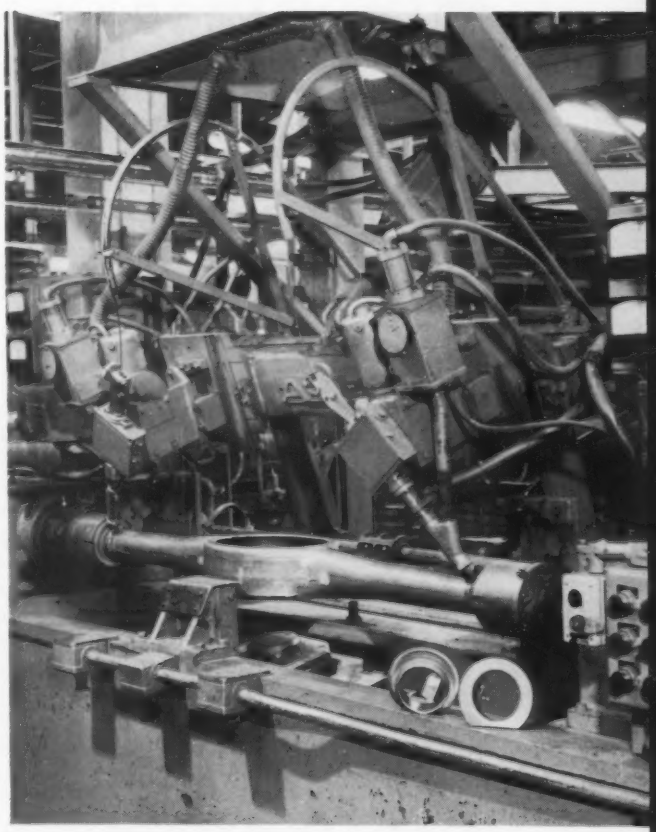
ends join the housing. A pneumatic expander locates and clamps the housing to a rotating fixture. Before welding flange hubs are pneumatically pressed over tube ends. Limit switches control distance from flanges to the center of the banjo, so air pressure is reduced when flanges are correctly positioned.

Fillet welds simultaneously attach each flange hub as the axle is rotated one turn plus 1½-in. overlap. During welding, flux to submerge the arcs feeds automatically through tubes surrounding the electrodes. On completion of weld, the fixture rotates back to loading position.

Pressure tested for leaks

Welds made on Expert and Agnew machines are checked by water immersion tests with air at 6 psi. Leaks are repaired by hand arc welding, as housing must be oil tight. After testing, axles are transferred to an inspection station where Sheffield Multicheck gages check length of axle housings from ends to banjo center, and ends to banjo OD. Checks also are made with plug gages and other inspection equipment. A general visual inspection is included to insure final acceptibility.

Before axles go to the machine shop, other automatic arc welding machines apply external brackets and fittings, all of which are steel stampings. Although axles are produced in a building apart from the Sheet Metal Plant in which such work was done before, the operations are handled by the same department and under the same supervision.



FLANGE HUBS are pressed pneumatically over axle housing ends, fillet-welded as fixture rotates.

Premiums cut 50 pct—

Automatic Fire System Minimizes Paint Shop Risks

◆ Despite fire-fighting advances, fire losses in U. S. continue on a ragged, long-term rise, may nudge annual $1 billion mark within next decade . . . Industry picks up large piece of this tab.

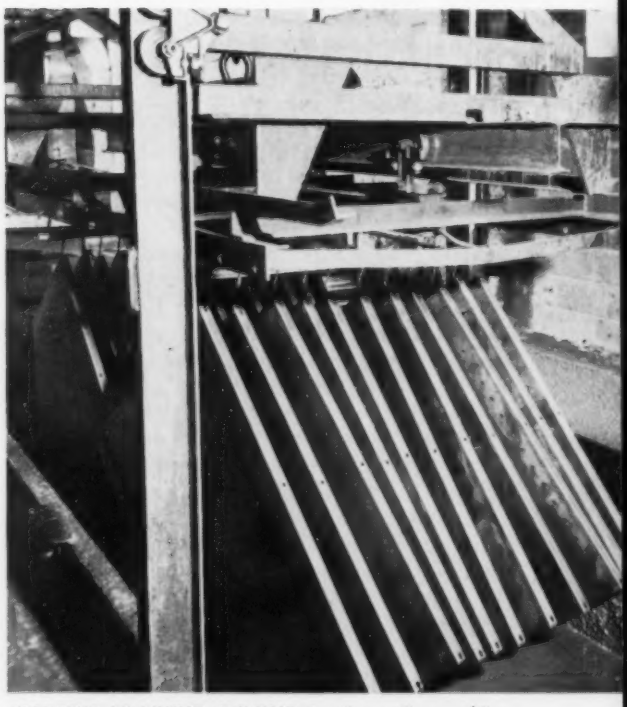
◆ Most plants are vulnerable . . . Still, its smaller operator who's most apt to be caught with his extinguishers down . . . Here's how one plant, already burned once, set about hedging against future fire risks with improved equipment.

◆ FIRE CAN STRIKE even the best-prepared industrial plants, since some vital operations are by nature hazardous. Modern advances in fire-fighting and fire prevention can greatly minimize the risks, though, affording greater protection for life, property and production.

In 1951, a sudden flareup completely wrecked a $7000 drying oven at Neimann Steel Equipment Co. of Philadelphia—and suddenly brought the problem of fire safety into sharp focus. Insurance covered the damage, and there were no injuries. Still, the accident cost an estimated 20 days of production, and that hurt.

Company president Stanley Neimann recalls the episode. "We were severely handicapped," he says. "We were able to make some shipments out of inventory and keep the plant running, with severely reduced operating schedules. But after forming, finished pieces simply piled up at our paint section."

The spur was sufficient. Insurance representatives were called in and asked to make a complete survey of the 20,000 sq ft plant and its entire fire-fighting and safety equipment. Soon, existing safety apparatus was supplemented with new rate-of-temperature-rise fire detection devices, tied in with a central A.D.T. alarm system. A number of new water, carbon dioxide and dry chemical portables also appeared, and roll-down



SHOULD FLAREUP OCCUR in these flammable synthetic enamel baths, rate-of-temperature-rise detectors trip eight 75 lb CO_2 cylinders, extinguishing blaze in seconds.

steel fire doors were installed in a concrete fire-resistant wall dividing the plant into two sections.

Most important, however, was the safety consideration given the painting section, where 10 men are employed. Here, fabricated steel parts are washed in a high flash naphtha bath to remove the protective oil film. Next they are hung on an overhead conveyor and lowered into a dip tank. This contains either gray or green synthetic enamel. After the color bath parts are carried by the conveyor over a drain board and finally are rolled into a gas-fired, 1900 cu ft drying oven, where they bake at 350°F for about 30 minutes. Adjacent to the drain board and drying oven is a paint spray booth. Here special finishes can be applied or oversized pieces painted.

Ever-present hazard

The highly flammable enamel is an ever-present fire hazard, despite forced draft fans which exhaust vapors to the out-of-doors and protection afforded by a number of carbon dioxide and dry chemical portable extinguishers.

Recognizing this special danger, Neimann asked Walter Kidde & Co., Inc., to design and install built-in carbon dioxide systems.

This was done. Eight 75 lb cylinders of carbon dioxide were provided for the dip tank, drain board and paint spray booth. Should a fire flare up in any of these, rate-of-temperature-rise fire detectors mounted above the equipment immediately detect the abrupt temperature rise. They transmit a pneumatic impulse to the cylinders, actuating them.

The inert gas then passes under its own pressure through piping, discharging from multi-jet nozzles into the on-fire area. Volume is sufficient to reduce oxygen to a point below that needed to support combustion. This promptly smothers the fire.

A separate system requiring two 75 lb cylinders was installed for the drying oven. This system is actuated by an electric thermostat, which is set slightly above the operating temperature of the oven.

The two systems are interconnected and have pressure operated switches and trips. If either system is actuated, the switches and trips close or shut off all ventilation dampers and fans. Simultaneously, power to painting equipment is cut off and the steel fire doors roll down effectively, compartmenting the blaze.

The fire safety system has already proved its worth. A flash fire occurred in the drying oven shortly after its installation. The fire system promptly flooded the oven with inert carbon dioxide gas, snuffing out the fire in seconds and preventing damage. Shortly afterward the company was able to resume orderly painting of steel pieces.

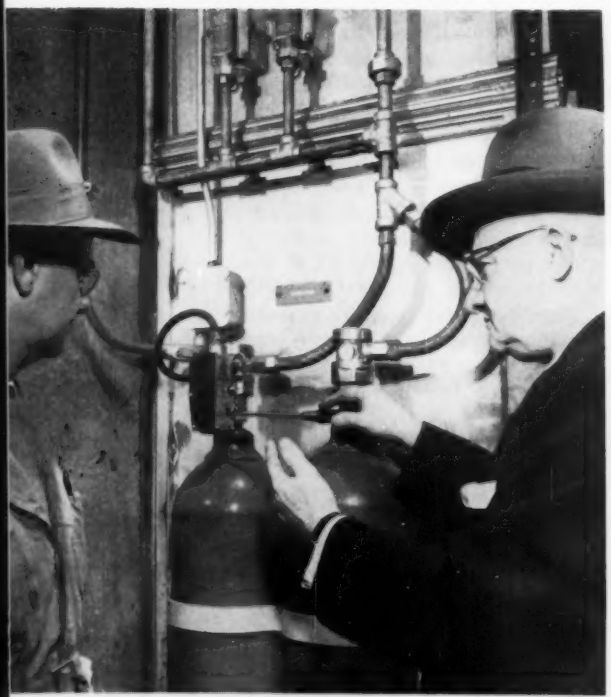
Besides the primary purpose of providing superior fire protection for the vital and expensive painting equipment, the Company points to other advantages from using carbon dioxide. Being an inert gas, it cannot damage production equipment or in-process work. Also it is a non-conductor of electricity. Finally, it eventually dissipates into the atmosphere following discharge, and so leaves no mess behind.

More units planned

Two additional carbon dioxide systems are planned for installation in the near future. The first will protect tubs used to wash fabricated steel pieces prior to painting. This is not a severe hazard. But washed off oil does accumulate and float on top of cleaning fluid. This system will also protect the plant area in which paints and solvents are stored and mixed.

Neiman feels that its combination of personnel trained in the use of the plant's numerous portable extinguishers, plus the automatic built-in carbon dioxide systems for the severe hazards and the overall fire detection system puts it in excellent position to cope with any kind of fire emergency.

As an added bonus the company reports that its fire insurance rate with the new extinguishing equipment is held to less than 50 pct of what it would be without such modern protective arrangements.



INDICATOR (being reset) shows if equipment is ready-to-go or discharged. Two box-like elements above, in fire emergency, act to shut off ventilation, stop painting, roll fire doors down.

Molybdenum at work—

New Carburizing Steels For Critical Gearing

PART II

◆ Making use of Molybdenum as the chief alloying element, a new series of carburizing steels is proving its superiority on the production line and in automotive gear performance tests . . . These extra tough alloys combine high case hardness with optimum wear resistance.

◆ For heat treating short cuts, they can be quenched directly from carburizing . . . Retained austenite is not a problem . . . Equally important, these steels vastly simplify control of surface carbon content.

By R. S. ARCHER, Chief Metallurgist,
V. A. CROSBY, Metallurgist, and G. A. TIMMONS, Director of Research,
Climax Molybdenum Co., New York

◆ OUTSTANDING results have been obtained in an investigation of a series of new carburizing steels with molybdenum as the principal alloying element. These steels can develop high surface hardness over a wide range of carbon contents on direct quenching. Thus, they are less sensitive to variations in carburizing conditions and can provide optimum results even when close carbon control is not practical.

A steel containing 0.50 pct Mo and 0.50 pct Mn seemed suitable for passenger car ring gears and pinions. Material from several heats produced by commercial alloy steel mills has been made into gears by several automotive plants.

Production trials have shown that the 0.50 pct Mo-0.50 pct Mn steel performed as well as, or better than, the best steel used previously for the same part. It provided similar or better tool life and surface finish. With similar or less distortion, it produced a higher case hardness. Gear performance in dynamometer tests showed similar or better performance.

The compositions and sources of the steels examined are given in Table I. Results obtained on a laboratory induction furnace heat corresponding in composition to AISI 4317 are shown in Fig. 1. The carbon gradient bar had an average carbon content of 1.23 pct in the outer 0.005 in. zone of the case (Table II).

The tendency of the chromium content of 0.48 pct to increase carbon content seems to be neutralized by the nickel content of 1.82 pct which tends to keep down the surface carbon.

End-quench hardenability curves for 4317 are given in Fig. 1 for the core (0.19 pct C) and for three carbon levels in the case, corresponding to 1.10, 1.00, and 0.90 pct C as indicated by the carbon gradient bar. Case hardenability is very high, as shown by horizontal "curves" to 40/16 in. for each carbon level.

Carbon contents critical

Note, however, that the case *hardness* drops from 65 to 60 Rc as the carbon content increases from 0.90 to 1.10 pct. This is attributed to greater amounts of retained austenite at the higher carbon levels.

Results pertaining to a commercial heat of AISI 4028 are shown in Fig. 2. The carbon content of the outer 0.005 in. zone is again 1.23 pct as in the case of 4317 (see Table II), which is also approximately the same in AISI 1018 carburized under the same conditions. At 2/16 in. the hardness is 67 Rc at 0.90 pct C. The slightly lower value of about 65.5 Rc at 1.10 pct C probably indicated a little more retained austenite. Manganese and residual chromium

This is the final installment of a two-part article. Part I appeared in the Feb. 9 issue and reviewed requirements of carburizing steels, experimental heats, carburizing and hardening procedures and hardenability test results.

TABLE 1

Compositions of Steels Tested

Grade or Type	Heat No.	Source	Analysis, Pct						
			C	Mn	Si	Mo	Ni	Cr	S
4028		Com.	0.25	0.73	0.24	0.22	0.14	0.14	0.047
4118		Com.	0.22	0.83	0.25	0.12	0.04	0.48	
4317	3081	Lab.-Ind.	0.19	0.58	0.29	0.25	1.82	0.48	
4620		Com.	0.19	0.56	0.27	0.23	1.72	0.21	
4817	3080	Lab.-Ind.	0.18	0.51	0.29	0.25	3.47		
8620		Com.	0.19	0.75	0.28	0.21	0.60	0.56	
1.0 Mo-0.50 Mn	—	Com.	0.18	0.55	0.29	1.02			
0.7 Mo-0.85 Mn	3064A	Lab.-Ind.	0.19	0.87	0.27	0.70			
1.0 Mo-0.85 Mn	3075A	Lab.-Ind.	0.18	0.90	0.27	1.00			
0.4 Mo-1.25 Mn	3083A	Lab.-Ind.	0.17	1.22	0.22	0.41			
0.7 Mo-1.25 Mn	3084A	Lab.-Ind.	0.17	1.24	0.22	0.70			
1.0 Mo-1.25 Mn	3079A	Lab.-Ind.	0.19	1.29	0.23	0.98			
0.50 Mo-0.50 Mn	3128	Lab.-Ind.	0.17	0.47	0.27	0.54	0.16	0.09	
0.50 Mo-0.50 Mn	3129	Lab.-Ind.	0.23	0.56	0.32	0.60	0.16	0.08	
0.50 Mo-0.50 Mn	3135	Lab.-Ind.	0.23	0.55	0.23	0.51	0.18	0.09	
0.50 Mo-0.50 Mn	02450	1 Ton Arc	0.16	0.51	0.15	0.45	0.12	0.15	
0.50 Mo-0.50 Mn	02455	1 Ton Arc	0.19	0.52	0.23	0.51	0.12	0.20	
0.50 Mo-0.50 Mn	02448	1 Ton Arc	0.24	0.50	0.39	0.52	0.08	0.13	
0.50 Mo-0.50 Mn	60046	Com.	0.20	0.55	0.37	0.59	0.04	0.07	0.051
0.50 Mo-0.50 Mn	60047	Com.	0.23	0.54	0.36	0.50	0.05	0.08	0.032

may be the main contributors to this condition.

These steels illustrate the difference between case *hardenability* and case *hardness*. AISI 4317 obviously has much higher hardenability than 4028. For this reason, hardness values above 60 Rc can be obtained in much heavier parts at carbon levels from 0.90 to 1.10 pct. But 65 Rc was obtained only at the 0.90 pct carbon level.

On the other hand, hardnesses above 65 Rc can be obtained at all three carbon levels with 4028 provided the cooling rate is greater than about 125°F per second at 1300°F, corresponding to 4/16 in. on the end-quench curve.

A hardenability curve for a commercial heat containing 1.02 pct Mo and 0.55 pct Mn is shown in Fig. 3. Maximum carbon content near the surface is about the same as in 1018 and 4028. This indicates that molybdenum is concentrations up to 1.02 pct has no tendency to increase surface carbon content.

For all three carbon levels—0.90, 1.00, and 1.10 pct—case hardness remains above 65 Rc to the end of the specimen at 40/16 in. These results demonstrate that molybdenum by itself has relatively little tendency to cause retained austenite under these conditions. In contrast, the Cr-Mo-Ni steel, 4317, developed hardnesses of Rc 63-64 at 1.00 pct C and hardnesses of only 60-61 Rc at 1.10 pct C.

It should be noted that some of the standard steels which show decreased hardness at 1.10 pct C because of retained austenite, are capable of developing somewhat higher hardness after special heat treatment—normally, reheating and quenching from a lower temperature.

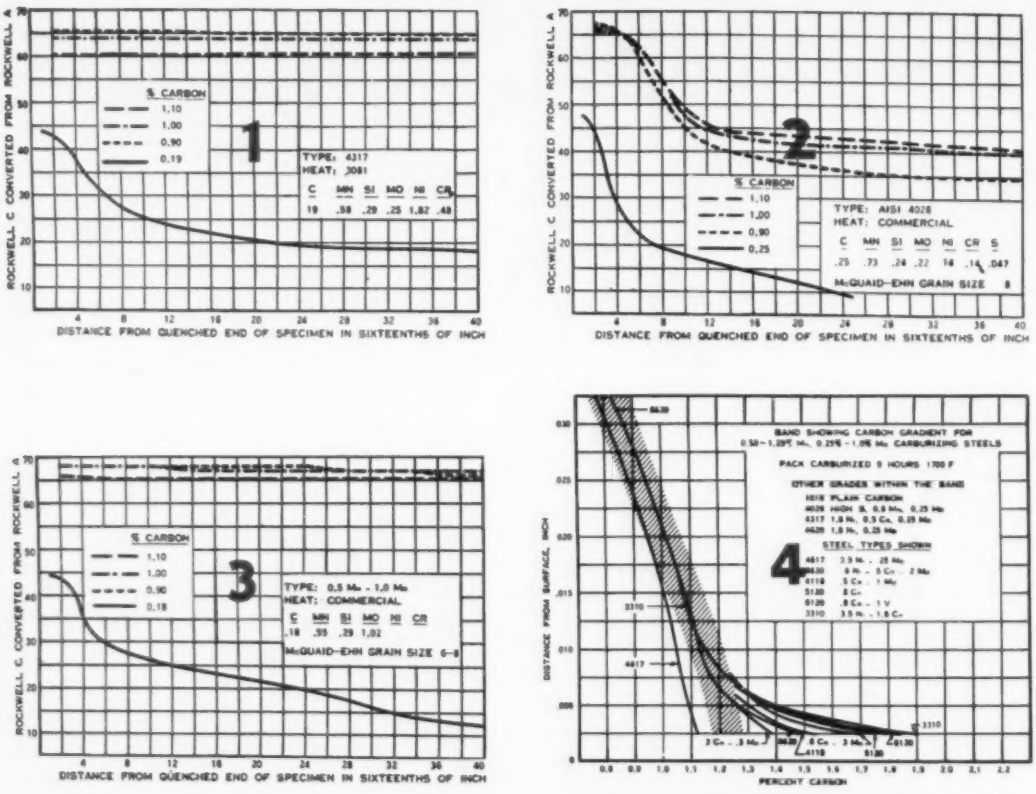
The results of carbon gradient tests on a number of standard and experimental steels are summarized in Fig. 4. Both 4118 and 8620 show the effect of chromium, having carbon contents of 1.50 and 1.45 pct respectively, from 0.000 to 0.005 in. below the surface. The retarding effect of nickel is shown in 4817 with 1.13 pct C in the same zone.

How molybdenum helps

Concerning the relative effects of chromium and molybdenum on the surface carbon contents developed in steels during carburizing, a direct comparison was provided by a gas carburizing experiment in which the carburizing medium was mild compared with the solid carburizing mixture previously described.

Table II shows Rc values at 6/16 in. for case hardness at 1.10, 1.00, and 0.90 pct C. Surface cooling rates of automotive gears, for both passenger cars and trucks, will usually be faster in commercial oil quenching than the cooling rate at 6/16 in. on the Jominy specimen.

The low case hardness of 4028 at 6/16 in. is due to the low alloy content of this grade. Rc values above 65 were obtained from 2/16 to 4/16 in. The hardness of 4118 at the 0.90 pct



C level begins to drop at about 4/16 in. Each of the other steels of Table II has a constant case hardness from 2/16 to 6/16 in. or beyond at any given carbon level.

The high hardenability steels 4317 and 4817 show comparatively low hardness of 60 Rc at 1.10 pct C and 6/16 in. At all three carbon levels, the curves for 4317 run straight across the chart (Fig. 1) but those for 4817 begin to drop appreciably beyond about 8/16 in. The curves for heat 3075A (1.00 pct Mo-0.90 pct Mn) run straight across the chart, as for 4317, but at higher hardness levels.

All the experimental Mo-Mn steels of Table II show 63-67 Rc at 6/16 in. for 1.10, 1.00, and 0.90 pct C, except the very high hardenability steel with 0.98 pct Mo and 1.29 pct Mn. The relatively low hardness value of 61 Rc at 1.10 pct is presumably due to retained austenite.

Table III permits a ready comparison of two standard and two experimental Mo-Mn steels of high hardenability.

Test results form the basis for three important conclusions:

1. Molybdenum up to 1.00 pct as the principal alloying element has no measurable tendency to cause excessive carbon build-up at the surface even under rapid carburizing conditions.

2. These molybdenum carburizing steels show high case hardness values at carbon levels from 0.90 to 1.10 pct when direct quenched after carburizing at 1700°F. These high hardnesses are indicative of low retained austenite.

3. These new carburizing steels maintain high case hardenability at hypereutectoid carbon levels up to 1.10 pct when direct quenched after carburizing at 1700°F. This is attributed to the inhibiting effect of molybdenum on the precipitation of pro-eutectoid carbides which would nucleate pearlite.

During the course of laboratory tests, opportunity was provided to examine microstructures of normalized and annealed bars of the various compositions studied. These revealed the regularity with which uniform distributions of proeutectoid ferrite and either pearlite or bainite were formed. Hardnesses under 169 Brinell were obtained with simple annealing cycles even when C contents were near 0.25 pct.

A most important use of alloy carburizing steels is for the production of automotive ring gears and pinions. Test results of the 0.50 pct Mo-0.50 pct Mn steel seemed to satisfy fully both part requirements and processing schedules. The

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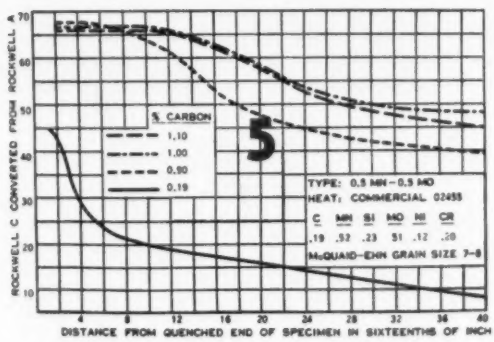
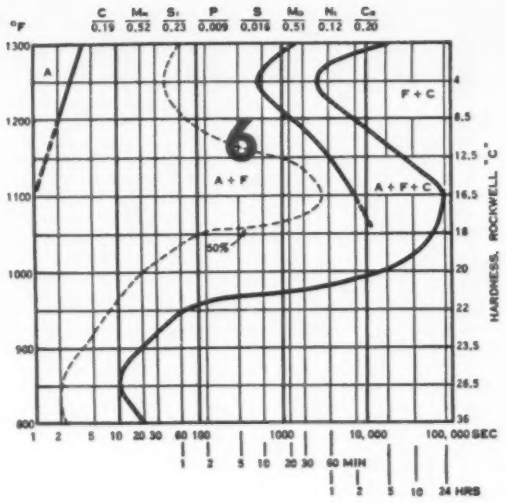
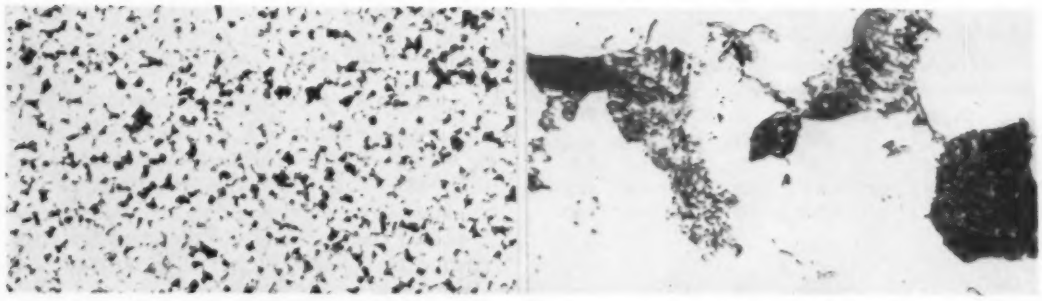


FIG. 6—(Right) Isothermal transformation diagram for 0.5 pct Mn—0.5 pct Mo carburizing steel.





FIGS. 7 & 8—Typical annealed structures from Heat 02448 at 100X (left) and 1000X (right).

TABLE 2 ■ Carbon Gradient, Case Hardenability, Core Hardenability

		Carbon at			Case Rc at 5/16ths in.			Core Rc at		
		.0025 in.	.0175 in.	.0325 in.	1.10 pct C	1.00 pct C	0.90 pct C	2/16ths in.	6/16ths in.	12/16ths in.
4028 (Com.)		1.23%	1.04%	0.83%	62[1]	62[1]	60[1]	44	23	17
4118 (Com.)		1.50	1.07	0.86	65[2]	65[2]	63[2]	46	26	20
4317 (3081)		1.24	1.04	0.83	60	64	65	43	31	24
4620 (Com.)		1.20	1.02	0.82	63	65	65	43	25	19
4817 (3080)		1.13	0.98	0.79	60	62	65	42	30	22
8620 (Com.)		1.45	1.05	0.82	64	65	67	44	27	21
Mo	**Mn**									
0.51	0.52	1.28	1.07	0.86	66	67	67	42	24	19
1.00	0.56	1.24	1.06	0.84	65	66	67	43	35	26
0.70	0.87	1.24	1.07	0.84	63	66	66	43	36	27
1.00	0.90	1.25	1.07	0.84	64	66	67	44	42	35
0.41	1.22	1.28	1.10	0.89	65	66	66	40	27	19
0.70	1.24	1.19	0.99	0.75	63	66	67	42	37	28
0.98	1.29	1.24	1.05	0.80	61	64	65	43	42	39

[1]—66-67 at 2/16. [2]—65-66 at 2/16.

TABLE 3

Comparison of High Hardenability Carburizing Steels

	4317	4817	1.00 pct Mo 0.90 pct Mn	0.98 pct Mo 1.29 pct Mn
Rc Values of Case 2/16 to 40/16 in.				
0.90% C	65	62–65	67	65–66
1.00% C	63–64	59–62	66	64–65
1.10% C	60–61	58–60	64	60–62
Rc of Core at 0.18–0.19% C				
6/16 in.	31	30	41	42
10/16 in.	25	23	37	41
16/16 in.	22	19	32	37

TABLE 4

Heat No.	Carbon, pct	Molybdenum, pct	Brinell Hardness, BHN Temperature of holding furnace F 1175°	1200°	1225°	1250°
02450	0.16	0.45	131	137	137	131
02455	0.19	0.51	143	137	134	137
02448	0.23	0.52	149	152	143	146

composition was also thought to lend itself to uniformity of hardenability, cleanliness, and close control in basic open hearth production.

Consequently, it was decided that the laboratory results should be shown to potential users and producers of the steel, and that quantities of the composition be made for full scale tests.

With this in mind, three one-ton, basic arc furnace heats of the 0.50 Mo- 0.50 Mn composition with varying carbon contents were procured from a commercial alloy steel producer. These heats are listed in Table I as Nos. 02450, 02455, and 02448. Hardenability data for one of these heats is shown in Fig. 5.

Delayed quenching is always a possibility in commercial production. To check the effects of delayed quenching, tests were run on Heat 02455. Case hardenability tests were run according to the described procedure except that one specimen was allowed to cool to 1550°F before quenching. Under similar conditions, a second specimen was quenched at 1200°F.

Delayed quenching from 1550°F produced no significant effect upon case hardenability at carbon levels of 0.90-1.10 pct. Quenching from 1200°F indicated greater hardenability for the 0.90 and 1.00 pct carbon levels. For the 1.10 pct carbon level, there was a decrease in hardness at positions on the Jominy bar beyond 6/16 in. These results demonstrate the capacity of the steel to develop uniform properties even when there is considerable latitude in commercial heat treating practice.

Since evaluation of the new steel would require machining the parts on regular production schedules, attention was given to the response of each steel to annealing treatments. The TTT diagram for Heat 02445 was prepared from actual transformation data (Fig. 6).

It was indicated that on cooling from the austenitizing temperature, an arrest in the range 1150-1250°F would develop a desirable structure for machining, at least under certain conditions. Small samples representing each of the three one-ton heats were heated to 1800°F and transferred to other furnaces at 1175°, 1200°, 1225°, and 1250°F. Held at these temperatures for two hours, the samples were air cooled to room temperature.

These treatments simulate the "cycle anneals" commonly applied to gear blanks of alloy carburizing steel by automotive manufacturers to prepare the forgings for machining. The hardnesses of these samples are shown in Table IV.

Moly aids machining

Despite variations in carbon content and holding temperatures, all hardness values were in the range 131-152 Brinell. The lower part of this range might be considered too low by some gear shops. But the narrowness of the range indicated considerable latitude in annealing operations.

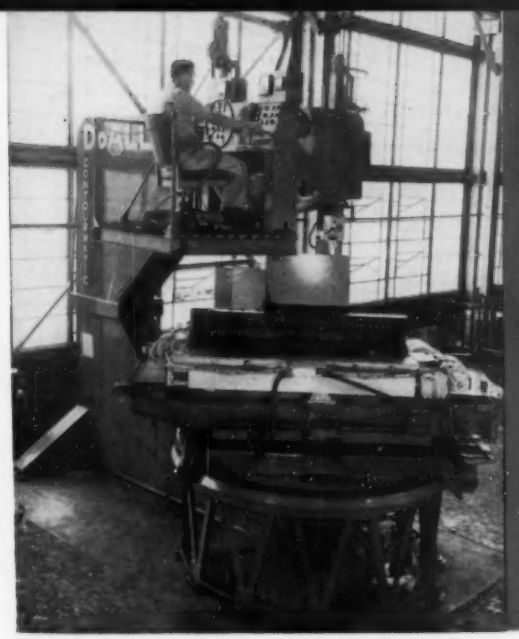
Typical microstructures of the steel annealed for machining are shown in Figs. 7 and 8. These microstructures were developed in a ring gear forging made from Heat 02448. The forging was cycle annealed in a production furnace to a hardness of 149 Brinell and machined to an excellent surface finish on a production run.

Material from the one-ton heats was supplied to interested manufacturers who ran pilot lots through their shops. They evaluated forging characteristics, response to annealing, machinability, carburizing characteristics, hardness patterns, dynamometer and vehicle road tests.

In all tests the steel performed satisfactorily. In some instances the results were so outstanding that manufacturers ordered full heats of steel for more extensive testing of machinability and performance.

Production trials have shown that the 0.50 pct Mo-0.50 pct Mn steel performed as well as, or better than, the best steel used previously for the same part. It provided similar or better tool life and surface finish. With similar or less distortion, it produced a higher case hardness. Gear performance in dynamometer tests showed similar or better performance.

One large manufacturer recently approved this steel for rear axle ring gears and pinions. Others are continuing tests. A variety of compositions in which molybdenum is the principal alloying element are also being considered.



WORLD'S LARGEST band sawing machine is controlled by airplane-type control wheel, on basis of what operator sees in a periscope like mirror. Saw will handle 10-ton, 26-in. thick parts.

MANUFACTURING TIME on these thick, heavy aluminum bulkheads for aircraft was cut considerably by stack-sawing them. Note the complexity of contour, which operator easily followed.

Huge Saw Cuts Into Intricate Contours

◆ OUTSIZED CUTTING JOBS on both ferrous and nonferrous materials are being handled by a monster bandsaw capable of handling workpieces up to 26 in. in thickness and ranging in size to approximately 10 tons. The machine mounts a 41-in. blade; can cut 4-in. thick slabs of die steel at a 0.125-ipm rate.

The king-sized DoAll Contourmatic was originally developed for cutting the heavy and complex dies used in extruding aluminum. Two are currently in action, both used principally for cutting steel dies for the aluminum industry. Thus far, principal interest has come from aluminum industry quarters, though the manufacturer hopes to enlist considerable interest in steel mills as well.

Cuts Steel, Aluminum, Copper

A modified Contourmatic, put through its paces recently in the Midwest to demonstrate its versatility, began by cutting die steels, then switched to contour-cut aluminum alloy slab and heavy copper slabs.

Blade speed ranges on the saw are adjustable from as low as 50 to as high as 2000 fpm, to permit cutting the softer nonferrous materials as well as the steel die blocks. Working area is rated at 52 x 52 in. maximum.

The worktable itself is a buildup of three frames. There's a circular frame at the bottom and, mounted over it, two square frames moving at 90 degree angles to each other. Movement of each of these frames is tied together by electronic control in such a combination that the operator can feed work either directly or at a tangent for contour ends.

The operator sits on a control platform suspended from the head of the machine. Though he's handling the movement of three levels of the work table, his main control is nothing more than a simple steering wheel. A strain gauge measuring deflection of a backup beam behind the sawblade gives him the feel of the cutting job he's performing. A periscope-like arrangement of mirrors allows him to view the progress of the operation.

Other meters give him indications of feed pressure, feed and band speeds, other data.

GAS-DRIVEN STEEL PLANT generator, typical of equipment cleaned by corn-cob grit blasting, can be tented, blast-cleaned in considerably less time than with former hand methods.

Use corn-cob grits—

Why Not Blast Clean Large Equipment?

◆ CLEANING accumulations of grease, dust and dirt from large electrical motors and generating equipment presents a big problem. Formerly, a five-man crew answered it with elbow grease, working a total of 500 hours with handscrapers, rags and solvents to remove the offending matter.

Now the job is being done, with a greatly reduced labor requirement, by blast cleaning with corn-cob grits. Two portable Pangborn blast cleaning units help seven men turn the trick in a total of 200 hours.

Preliminary Steps

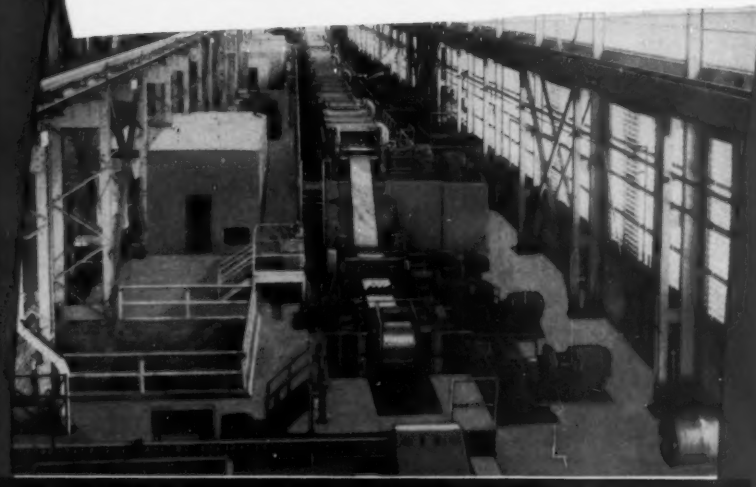
The 6600 v, 3500 kw, 25 cycle gas driven generator is a good example of the kind of items suited for this type cleaning. Procedure is relatively simple. First step is to shift stators and rotors far enough apart to expose areas to be cleaned. A canvas tent consisting of two 28-ft diam canvas side pieces and a 9-ft joining strip is then built over the entire generator to confine the grits.

Twenty mesh corn-cob grits are then fed into two Pangborn AC-4P blast cleaning machines, and compressed air at 90 to 100 psi is connected to the units from the plant system. Pressure from these machines is stepped down to 20 to 25 psi while cleaning such relatively soft parts as coils and windings. For metal surfaces and hard parts, pressure is increased to 55 to 60 psi. The entire generator is blown off with air alone, at 20 to 25 psi, after blast cleaning.

The canvas tent and special nozzles to achieve better cleaning between windings and through air ducts were developed on the job.

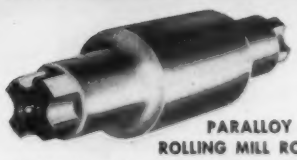
Grits are recovered, screened, and reused.

"YOUNGSTOWN" EXPERIENCE PAYS OFF IN BETTER RESULTS FOR YOU

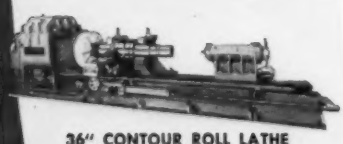


Steel Mill Equipment - Heavy Machines - Complete Lines

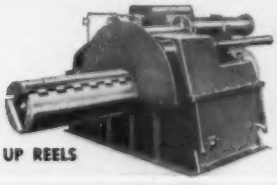
SCRUBBER & CLEANING LINE



PARALLOY ROLLING MILL ROLLS
MERCHANT—ROD—BAR—SKELP



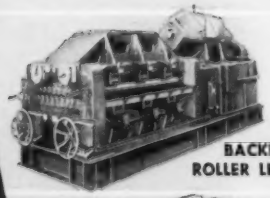
36" CONTOUR ROLL LATHE



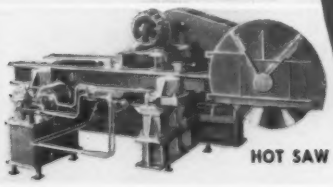
TAKE UP REELS

SLAB PUSHER

90" x 240" x ¼" STRETCHER LEVELER



BACKED UP ROLLER LEVELER



HOT SAW

DUCTILE RUN-OUT TABLE ROLLS

"Youngstown" Machinery serves major steel mills from coast to coast

"Youngstown" is well-known for its 70 years of experience in the designing, engineering and building of heavy, steel mill machinery. Pictures at left show a few examples . . . Complete lines—major units and auxiliaries. Additional "YF&M" products include ductile iron gears, rolls and castings up to 100,000 pounds.

"Youngstown" also builds extrusion presses and equipment for the "light metals" industry.

Modern Pickling Line cuts costs for western mill

Better pickling with less acid consumption . . . "Youngstown's" latest high speed continuous strip pickling line utilizes a new pull-thru type TRIPLE SCALE BREAKER that eliminates the need for a pinch roll stand.

Complete Scrubber Line built for midwest plant

This typical sheet scrubber line provides the ideal solution to the cleaning problem involving enamel sheet stock, dry or oiled stock, sheets for tin plating and special service sheets.

36" Contour Roll Lathe wins laurels for new improvements

Completely hydraulic tracer control insures smoother, more accurate finish. Featured improvements provide better turning, either on necks or centers. Built to suit specific needs.

Slitting Line speeds production for brass manufacturer

This complete 25" slitting line for brass and copper is giving "right-for-the-job" service. "Youngstown" has the correct answer for any slitting problem, whether it is .002" brass, copper, aluminum, or ⅜" steel plate.

Ductile Run-out Table Rolls excel in hot strip mill

Ductile cast iron rolls are reducing maintenance in leading mills. Especially good under the sprays. Resist heat check and breakage. Ductile iron is the ideal maintenance material for aprons, roller boxes, looper tables and looper rolls.

Consult us about your problems.
Let us quote on your requirements.

The Youngstown Foundry & Machine Co.

SERVING INDUSTRY SINCE 1885

Youngstown, Ohio

Y F&M

FREE AIDS

New Technical Literature:

Catalogs and Bulletins

Nickel plating

An illustrated 20-page instruction manual on bright nickel plating is offered. The three techniques for electro-depositing by one firm's process are described. The manual explains the proper bath preparations for these processes, the converting of existing baths to Nickel-Lume, and the effect of the important constituents. Solution maintenance, purification, handling of equipment and materials are discussed. Analytical procedures for all of the constituents, including the addition agents, are outlined. *Hanson-Van Winkle-Munning Co.*

For free copy circle No. 1 on postcard p. 109

FOR YOUR COPY

Money-saving products and services are described in the literature briefed here. For your copy just circle the number on the free postcard, page 109.

Perforated products

A 128-page general catalog (Number 62) on perforated materials will be sent on request to designers and purchasing agents. The catalog illustrates hundreds of different standard patterns at actual size and gives information as to hole size, centers and percent of open area. Other sizes of standard patterns are listed in tables below corresponding patterns. Information is given as to fabrication, facilities, ordering, materials that can be perforated and list of perforated sheets carried in stock. *The Harrington & King Perforating Co.*

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Aluminum use

A new 16-page, 8½ x 11-in., 3-color brochure has been issued to provide data on use of aluminum in heat exchangers. In the application information section are listings of some of the materials that can be handled satisfactorily in aluminum. The design information section carries a listing of the recommended alloys for heat exchanger components. *Reynolds Metals Co.*

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Beryllium copper dies

A new 4-page folder on the subject of beryllium copper dies is now available. Five separate subject headings are covered in the new literature: (1) plastic molds and dies, (2) forging dies, (3) steel forming and draw dies, (4) titanium forming and draw dies, and (5) zinc die casting dies. *The Beryllium Corp.*

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Radiant tube furnace

A batch type radiant tube heated furnace with recirculating fan and enclosed quench is described in a new folder. Processes where the furnace can be used, products heat treated and cycles of operation are fully discussed. Schematic drawings show parts of the standard size and heavy duty furnace models. *Surface Combustion Corp.*

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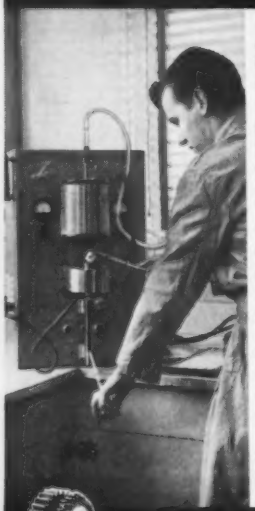
Another of the Reasons Behind Brad Foote Quality—

CARBON DETERMINATION



• In hardening gear teeth by carburizing, carbon content and depth of penetration are vitally important. BRAD FOOTE insures precise control of these factors through metallurgical tests with equipment developed specifically for this purpose.

• A test bar goes through the complete carburizing and heat-treating cycle with every batch of carburized gears. Shavings are taken from this bar at carefully measured depths. Chemical analysis of these shavings gives complete and precise data on carbon content and penetration.

• Carbon determination tests are only one of many metallurgical controls that insure the uniform quality of BRAD FOOTE Gears. Metallographic examination, hardness testing, chemical analysis—these are just a few of the quality checks provided by BRAD FOOTE's completely equipped metallurgical laboratories.

• Add these precise controls to specialized production and heat-treating equipment and a wealth of detailed experience in producing gears of all types—you begin to appreciate why BRAD FOOTE can produce better quality gears at substantial savings.

• Find out how BRAD FOOTE quality can save you money. Send us the specifications on your next job for quotation. No obligation of course. BRAD FOOTE MAKES ALL TYPES OF GEARS—IN A COMPLETE RANGE OF STYLES AND SIZES

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Rotary switches, meters

Rotary switches for operating such electrical instruments as ammeters, voltmeters, frequency meters, and P. F. meters; for such control functions as synchronizing, temperature indicating and on-off operations; and for controlling such electrical equipment as circuit breakers, transformer tap changers, motor operated rheostats, and governor motors are described in a new 8-page bulletin just released. *Allis-Chalmers Mfg. Co.*

For free copy circle No. 6 on postcard p. 109

Magnetic brake

A new booklet, entitled "Brake Adjusting Completely Eliminated," is offered. Containing many illustrations, the booklet describes in detail the construction, operation, and applications of a new completely self-adjusting dc magnetic brake. The brake is suitable for all types of dc motors. Through the use of rectifiers, the brake can be applied to ac motors. *Westinghouse Electric Corp.*

For free copy circle No. 7 on postcard p. 109

Air tools

A new 40-page catalog, condensed to pocket-size for handy reference, features a line of air tools, air hoists and automation tools. Two new tools for automation are described: automatic drills, B-1 series with 4 in. stroke; and Par-A-Matic Drills, ¼ in. capacity. Complete data is also given on air hoists in half ton and one ton capacity, with a choice of cable or pendent control and accessories. *Aro Equipment Corp.*

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Can testers

Lines of both automatic and hand-operated can testers are described in a new catalog. Testers illustrated and described include air testers for high and medium-speed lines, air testers for larger-sized cans, a tester for five-gallon petroleum and similar cans, and a line of hand-operated testers and detectors. The catalog describes the design features and operation of each tester. *E. W. Bliss Co.*

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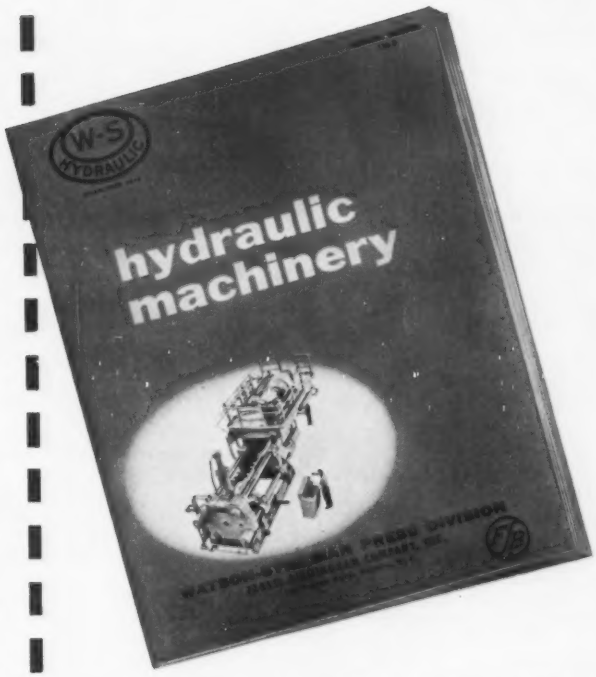
Send for your *FREE* copy today



This NEW, 24-page book tells what is available in hydraulic press equipment. Included are illustrations and brief descriptions of —

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- Standard and special hydraulic equipment for all types of industrial applications.

Established in 1848, Watson-Stillman is one of the oldest and best known manufacturers of hydraulic presses in the United States. The high quality of its products stems from a continuing program of research and development which has resulted in many important improvements in this type of equipment.

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ALUMINUM FINISHES

THE FINISHING TOUCH

by A. B. HOEFER
vice president
FREDERIC B. STEVENS, INC.

Will Anodized Aluminum Replace Nickel-Chrome Finishes?

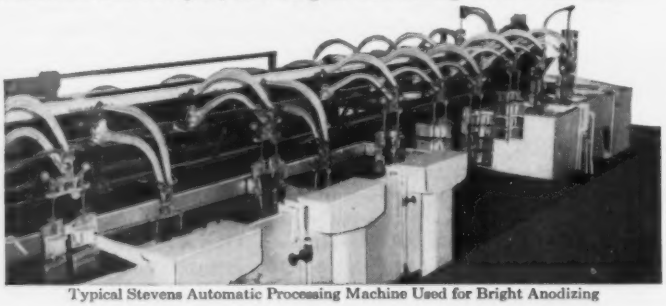
Affirmative answers to this question are revealed in several current business publications and our own sales figures.

Speeding the change is the continued tight supply of nickel. Manufacturers have been forced to look for substitutes for nickel and like the results anodized aluminum have given them.

A trend is developing. Volume of Stevens Automatic anodizing equipment sold in 1955 was nearly double the volume for the two preceding years. At the same time, sales of Stevens compositions used in buffing and polishing aluminum were showing a 50% increase.

Frederic B. Stevens, Inc., manufacture equipment for both nickel-chrome and aluminum finishes. We believe both types of finishes will increase in demand but at the moment the interest in aluminum is high.

If you are considering aluminum for your product, you can be assured that aluminum parts can be bright anodized and finished to compare favorably with the fine finish of chrome plate. In addition, aluminum can be dyed, resulting in non-fading colored finishes.



Typical Stevens Automatic Processing Machine Used for Bright Anodizing

Stevens aluminum anodizing equipment is presently being used and recommended in the finishing of colored anodized tumblers, utensils, refrigerator components, rivets, automotive trim, lighting reflectors, etc.

Stevens' experience in furnishing complete anodizing equipment installations assures you of the latest techniques—the finest finishes —at the lowest costs.

For long range planning consider the versatility of Stevens Automatic equipment. Changes of cycles or processes can be accomplished quickly and inexpensively. Your Stevens Automatic Processing Machine for anodizing can be changed to a nickel-chrome cycle at a later date.

If your design engineers are talking of aluminum to add sales appeal excitement, cost reducing features to your new product lines, let us discuss your requirements with you.

For further information write to Frederic B. Stevens, Inc., Detroit 16, Michigan.

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Sintered metal bearings

Engineering Bulletin No. 18 discusses design requirements, metallurgical requirements, and alloy selection of sintered metal bearings for various applications. A table is presented which pairs specific bearing needs with the alloy from one manufacturer that best fulfills each need, and adds pertinent comments. Another table lists grades and composition, average density, average tensile strength, elongation, and average radial crushing strength. *United States Graphite Co.*

For free copy circle No. 10 on postcard p. 109

Belting

A data sheet on a line of multi-V belts, featuring a patented, Grommet construction feature, has been published. The data sheet covers Grommet V belts, high capacity Grommet V belts, high capacity static conducting belts, oil-resisting V belts and Double-V belts. Included in the data sheet is a chart showing standard and high capacity V belt numbers, sizes and pitch lengths. An interchange list for Multi-V belts is also featured. *B. F. Goodrich.*

For free copy circle No. 11 on postcard p. 109

Capacitor

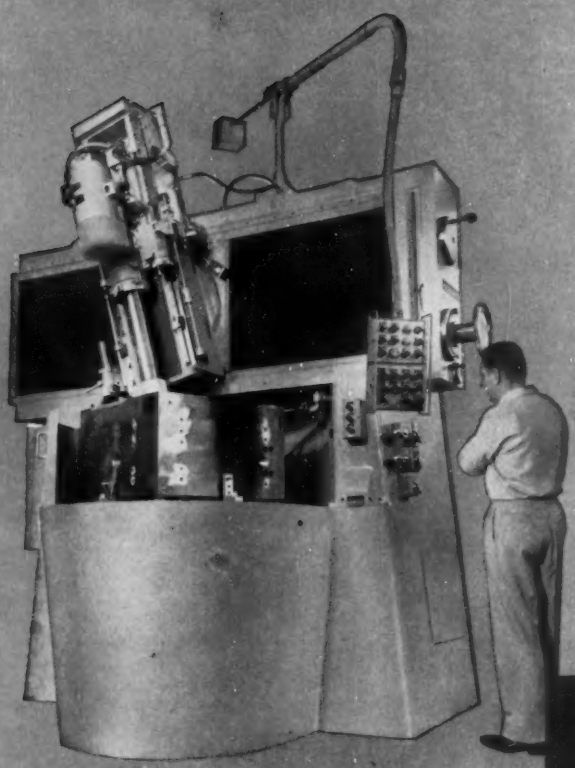
Information is available on a new type of tantalum capacitor, known as Type STA. Preliminary laboratory and field tests are described as indicating very favorable characteristics over a temperature range extending from −94°F to +185°F. *Fansteel Metallurgical Corp.*

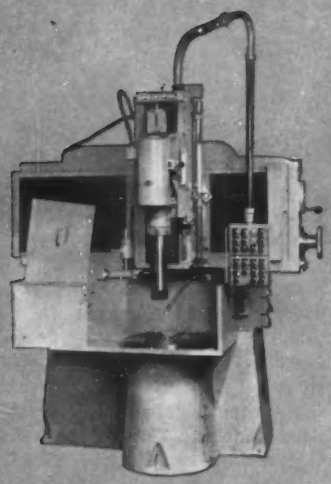
For free copy circle No. 12 on postcard p. 109

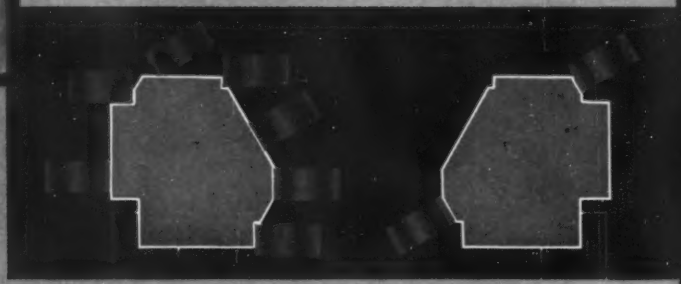
Lubrication pumps

Catalog No. 108 covers a line of compact, cartridge-type lubrication pumps. According to the literature, these pumps are available in two types: Models LF and LFD for non-directional service; and Models RF and RFD with automatic reversing feature. Both types, it is stated, are designed for flange mounting with choice of internal or external porting and with or without shaft seal. Capacities range from 55 to 170 gph. *Tuthill Pump Co.*

For free copy circle No. 13 on postcard p. 109







one setup: nine jobs

As flexible, as responsive as a dentist's drill, a Springfield Vertical Universal Grinder can reach around and into a workpiece to do nine different jobs on one chucking.

If you make a pipeline valve, a mold, a bearing race—requiring micro-inch finish on any or all the faces shown in the diagram—at whatever angle—look into Springfield. These grinders cut down the number of set-ups, frequently eliminate hand-lapping, operate with fewer work-holding devices. And, as a bonus, on jobs calling for extreme concentricity, one angle setting of the Springfield head grinds both faces of mating parts.

All three models readily adaptable to special problems.

Vertical Universal Grinders: swings 18″, 24″ and 42″.

Lathes: Engine and tool room, contouring and reproducing—swings 14″ to 32″.

The Springfield Machine Tool Company

Springfield, Ohio

68TH YEAR OF BUILDING IDEAS INTO MACHINE TOOLS

SPRINGFIELD

THERE'S A RIGHT GAGE FOR EVERY JOB

Each system of gaging has its own special advantages and limitations

No one gaging system is superior to another except as it meets the certain requirements of the job. The type of gaging system you select should be determined only after your most careful consideration.

If your company is a mass producer, you need Machine Control and Automatic Sorting Gages, of course, but you also require other types of gages — each selected to suit your particular need.

Some Federal Gages are capable of detecting dimensional variations **as fine as one millionth (.000001") of an inch.** But there are far more cases where it is necessary for a gage to measure only one ten-thousandth of an inch (.0001"), or even **one thousandth** (.001").

It is, of course, a waste of good money to buy costly gages designed for a high degree of accuracy when they are to be used on everyday jobs. For instance, Dial Indicator Gages generally cost only a fraction as much as an Air Gage and they prove entirely satisfactory in accuracy and speed for most jobs. Furthermore, with these simple gages, you are not troubled with air lines and their maintenance. On the other hand, Air Gages are desirable for fast, foolproof gaging of holes, for gaging superfine surfaces, and for checking certain dimensions that are difficult to reach by other gages.

From both an economical and practical operating standpoint, it's important to select the **right** gage for your job. Since we specialize in gages utilizing all modern gaging systems and are thoroughly acquainted with gaging techniques, we can impartially recommend the **right** gage to do your job successfully. Call us about your requirements.

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Dial Indicators are lowest in first and last cost. Capable of gaging up to one ten-thousandth of an inch (.0001") and sometimes to half a tenth (.00005"), they are exceedingly adaptable, fast, and simple, — the most universally used type of gage. Ask for Catalog 55.

DIAL INDICATOR GAGES

The Federal line is complete — includes all types of Dial Indicator Gages . . . snap, hole, depth, caliper, etc., and special. Ask for Catalog 55G.

MODIFIED GAGES

Federal Catalog Gages can often be modified at slight expense to meet special gaging requirements. Bring your problems to us. Ask for Catalog A-445.

AIR GAGES

Gaging with air has its own particular advantages: On such jobs, Air Gages are practically foolproof. With AirProbes they can be applied to dimensions that are inaccessible by other methods. They are, however, higher in price and may be more costly to maintain than Dial Indicators. Ask for Dimensionair Catalog No. 56D.

AUTOMATION GAGING SYSTEMS

Machine tools, glass tube and wire covering machines, etc., can be automatically controlled to produce work which is dimensionally accurate. Ask for Catalog 56AM.

AUTOMATIC GAGING & SORTING

Federal uses any and all gaging systems and can select the one best suited for accuracy, speed, and convenience. Federal Gages automatically gage and sort workpieces of all shapes and sizes, from holes .002" diameter in small ⅛" diameter parts, to automobile wheels. Ask for Catalog No. 55 AG.

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FOR RECOMMENDATIONS IN MODERN GAGES . . .

Dial Indicating, Air, Electric, or Electronic — for Inspecting, Measuring, Sorting, or Automation Gaging

FREE TECHNICAL LITERATURE

These publications describe money-saving equipment and services . . . they are free with no obligation . . . just circle the number and mail the postcard.

This section starts on p. 104

Rubber goods

A new catalog on hose, belting, packing, molded and lathe-cut goods and mats has just been released. The 72-page catalog is fully illustrated, contains information on sizes, weights, applications, construction features and other material pertinent to product use. Write on company letterhead to *Hamilton Rubber Mfg. Corp., Meade Street, Trenton, N. J.*

Chucks

A complete new catalog, designed to simplify the specifying and buying of a company line of chucks, has been published. Features include a visual reference index for quick location of the type of chuck wanted, sectionalization of each type of chuck together with corresponding jaws and parts. Complete illustrations and dimensional drawings are included of all chucks, jaws and parts for ready identification. *E. Horton & Son, Co.*

For free copy circle No. 14 on postcard p. 109

Fire protection

A 28-page catalog discusses in detail plant fire protection systems. Covered are methods of fire detection as well as methods of fire prevention, control and extinguishment using the major mediums of fire-fog, airfoam, high pressure CO_2, low pressure CO_2, and dry chemicals. Included is a 2-page chart listing occupancies for fire hazards involving flammable liquids and involving fast-burning or explosive solids with the recommended handling of each case detailed. *Automatic Sprinkler Corp.*

For free copy circle No. 15 on postcard, p. 109

Headless set screw

Information is available on a hopper-fed headless set screw. Advantages claimed for this unit are, up to ten times faster application; automatic diameter-inspection and rejection of misfits; saving in floor space; success working with all metals and with plastics on any product using headless set screws; and others. Offered in conjunction with the set screw is a unique mechanism for application that is furnished to users of the new product. With this mechanism, the specially designed set screws are mechanically fed from a vibrating hopper, down through a tube, and automaticlly positioned for driving by means of a roller device. *Set Screw & Mfg. Co.*

For free copy circle No. 16 on postcard p. 109

Baggage truck

Information is available on a new truck for use in handling baggage at airport terminals. This new 1000 lb capacity truck has ball-bearing fifth wheel steer and can be either pulled manually or, if equipped with a towing eye in the handle, pulled by tractor. *Lewis-Shepard Prod., Inc.*

For free copy circle No. 17 on postcard p. 109

Plastic molding

An illustrated new bulletin on a line of injection molding machines has just been released. The literature explains in detail the operation of one firm's line of molding machines and covers all important specifications. Product photos show outstanding examples of plastic ware designed and produced by the latest methods. *Hydraulic Press Mfg. Co.*

For free copy circle No. 18 on postcard p. 109

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Circle numbers for Free Technical Literature or Information on New Equipment:

1	2	3	4	5	6	7	8	9	10
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31	32	33	34	35	36	37	38	39	40
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Paint finish

The application of Nubelite, a custom-formulated industrial paint finish for use on any metal product, is highlighted in a new brochure. The illustrated, 20-page brochure displays a wide range of Nubelite-finished consumer products including: automatic washers and dryers, ironers, steel kitchen cabinets and a host of other metal-made products for the home market. It is emphasized in the booklet that Nubelite is a customized finish, specially formulated to meet the varied requirements of different manufacturing processes and to satisfy the specific resistance factors demanded by the end product. *Glidden Co.*

For free copy circle No. 19 on postcard p. 109

Hoses

A new 64-page industrial catalog has been released by a manufacturer of low, medium and high pressure hoses for air, water, fuel, lube and hydraulic applications, as well as special hoses for steam, LP-Gas, Freon and fire-resistant hydraulic fluids, and detachable, reusable fittings and couplings. The catalog also provides information designed to add solving fluid line problems encountered by designers of machine tools, trucks, construction equipment, engines, farm equipment and hundreds of other industrial products. *Aeroquip Corp.,*

For free copy circle No. 20 on postcard p. 109

Machinery catalog

The Watson-Stillman Press Division, Farrel-Birmingham Company, Inc., has announced the availability of a new General Bulletin on its complete line of machinery. Included in a 24-page bulletin is detailed information on a company's line of machinery including: injection, compression, and transfer molding machines for the plastics industry; extrusion presses for ferrous and non-ferrous metals; metal-working equipment; railroad shop equipment; ordnance equipment; and standard and special machinery for general industrial applications. *Watson - Stillman Press Div., Farrel-Birmingham Co.*

For free copy circle No. 21 on postcard p. 109

Synthetic lubricants

A new 52-page booklet on synthetic fluids and lubricants has been issued covering properties, applications, and characteristics of these polyalkylene-glycol derivatives. The fluids and lubricants are described as having established uses as mechanical lubricants, hydraulic fluids, rubber and textile lubricants, heat-transfer fluids, antifoam agents, solvents, and formulation components. *Union Carbide and Carbon Chemicals Co.*

For free copy circle No. 22 on postcard p. 109

Bearing bronzes

A new 5 to 9 in. diam. continuous-cast bearing bronze (SAE 660) and the advantages the product offers in length, size, machining time, metallurgical superiority, and physical properties are described in 6-page Bulletin (No. 301). The bulletin brings together in tabular form stock sizes and weights of solid and hollow bronze bars from ½ to 9 in. in diam. *American Smelting and Refining Co.*

For free copy circle No. 23 on postcard p. 109

Beryllium copper strip

A new 12-page bulletin, "Specifying Beryllium Copper Strip," offers suggestions for ordering beryllium copper strip. Includes discussion of available alloys, tempers, sizes and tolerances with tabular data on properties. Presents data on mill-hardened beryllium copper strip that requires no heat treatment. *Penn Precision Products, Inc.*

For free copy circle No. 24 on postcard p. 109

Strainers

Literature is available on a line of strainers and air eliminators for use with liquid meters which offer straight-through flow, greater ruggedness and increased versatility. The new models—the 763 strainer and 764 air eliminator—are both described in a new bulletin (OG-326). Chief advantages of the new strainers are claimed to be larger screening area and double-basket construction which protects the screen from being stretched or distorted by fast-moving large particles. *Rockwell Mfg. Co.*

For free copy circle No. 25 on postcard p. 109

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American DiesELectric Locomotive Cranes

WORK AT TOP CAPACITY EVERY DAY!

Bethlehem Contracting Company, Bethlehem, Pa., steel fabricator maintains an enviable pace—one of the highest tonnage-per-employee production records in the industry. Skilled men and crack machines back up the compact, well integrated organization. Big helpers in Bethlehem's yard are two new American 25-ton DiesELectric Cranes that work at top capacity every day. American Locomotive Cranes utilize the powerful, efficient diesel-electric system that gives super smooth electric driving power at the trucks —super strong, economical diesel lifting power at the deck and boom!

Don't burn up profits in an old fashioned steam rig—check American's easy-to-operate, fast-cycling DiesELectric Locomotive Cranes—*the key to profitable production!* You'll be surprised to learn just how fast a DiesELectric will work off its cost.

AMERICAN HOIST
and Derrick Company
St. Paul 1, Minnesota

SEE PAGES 14-15

WARD STEEL CO.

PROMPT WAREHOUSE SERVICE ONLY

Most Complete Stock in America of

BLUE TEMPERED SPRING STEEL

We believe that the way to sell is to carry a stock which permits satisfying any reasonable warehouse demand.

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FORMING: Versatile Press Line

Auto wheel line planned to meet user's need for more production with units versatile enough for operating changes and flexible enough to fit further expansions in future.

Faced with a growing demand for its automobile wheels — to such an extent that it pushed the plant facilities close to maximum capacity, The Dunlop Rim & Wheel Co. of Coventry, England, Div. of Dunlop Rubber Company, looked for an answer.

Their engineers came to Clearing Machine Corp., Division of U. S. Industries, Inc., with this problem: provide a means of increasing production of auto wheels far beyond the present production rate, provide a means of increasing production during a period of labor shortage, provide equipment that would be flexible to accommodate design changes that auto manufacturers will come up with, and provide a press line to which additional presses could be added, and which would permit a variation in order of operation, with facilities for automatic production of large runs or hand loading for small job lots.

Four Unit Line

To meet this problem of flexibility, Clearing engineers designed a press line with four individual machines rather than a single large transfer feed press. Each machine is equipped with a feeding mechanism that integrates the four presses into an automated unit. However, whenever necessary, Dunlop can elect to run the presses independently of each other without using the feed. In fact, the line can be physically taken apart and put together in different combinations—as two press automatic units, or three press units—the arrangement depending upon the requirements of the parts to be produced. Some of the methods Clearing engineers have devised to provide Dunlop with this multiple purpose equipment are as follows:

WANT MORE DATA?

You may secure additional information on any item briefed in this section by using the reply card on page 109. Just indicate the page on which it appears. Be sure to note exactly the information wanted.

Presses in line can be operated independently of each other.

Press Features

The Dunlop line consists of four Clearing F type presses, a 275 ton lead press, and three 600 ton machines. All are one point, single action machines. The presses feature straight side welded steel frame construction, eccentric gear drive, and plunger guiding.

Plunger guiding is a press feature in which the drive pitman is connected to a vertically guided plunger in the bottom of the crown. All side thrust of the pitman is therefore absorbed within the crown and only a straight downward force is delivered to the slide. This eliminates any tendency for the drive to tilt the slide, resulting in more accurate closure under load and longer die life.

The clutch and brake unit includes a low inertia air clutch and brake which is cool running, long wearing and designed for easy maintenance.

Overload Protection

Overload protection devices are installed on the three 600 ton presses preventing an overload from occurring in the bottom ½ in. of stroke by placing a cushion of hydraulic fluid under the slide adjustment nut.

Although the transfer mechanism makes it virtually impossible to encounter a double blank, the overload mechanisms provide desirable protection against oversize stock or improper slide adjustment when setting dies. In addition, protection was also desired for the anticipated use of hand feeding. In hand feeding there is a greater possibility of double blanks or faulty placement of a piece part in the die.

While the line is in operation, a full basket of blanks is placed in position on a pneumatically elevated platform directly above the feed stack. When the previous supply of blanks has been reduced to six pieces, a limit switch is tripped which lowers the basket onto the stack. The basket cams are pushed aside and the contents of the basket are deposited on top of the stack. The basket is then returned to the top where it may be removed and replaced with another full one.

Timing Automatic Cycle

The blanks are fed into the transfer mechanism from the bottom of the stack. A push bar, operated by a hydraulic cylinder timed with the transfer feed, slides the bottom blank forward to a positive stop at station two. There is physically enough clearance to advance only one blank at a time from the hopper stack. As mentioned earlier, a limit switch is also provided at station two as additional protection against feeding a double blank.

The four presses all cycle at the rate of three seconds per stroke (20 spm). The transfer feed mech-

Practical Idea for the Production Man

Efficient electric hoists...to move materials overhead and release floor space for more valuable operations.

CM HOISTS

CM LODESTAR ELECTRIC CHAIN HOIST
⅛ to 1 ton capacites—First truly heavy duty version of small electric hoist. ⅛ ton model weighs only 51 lbs. Heavy duty self-adjusting brake. Upper-lower safety limit switches. CM-Alloy load chain.

CM METEOR ELECTRIC WIRE ROPE HOIST
½ to 5 ton capacities—Compact, enclosed design. Low headroom. Continuous duty motor with thermal overload protection for heavy duty service. Precision bearings and helical gears for long life. Only 110 volts at push button control.

Good Suggestion for the Maintenance Man!

Rugged lightweight hand hoists and pullers...to make your job easier and safer

CM CYCLONE HAND HOIST
¼ to 10 ton capacities—Easy to carry and lift. One ton model weighs only 36 pounds. Made of tough aluminum alloy. CM-Alloy load chain. High efficiency. Lifetime lubrication.

CM PULLER THE "ONE MAN GANG"
¾ to 6 ton capacities—Lifts or pulls at any angle. Lever handle operation. Automatic load brake holds at any point. ¾ ton model weighs only 13 pounds. CM-Alloy flexible load chain.

ALSO... *CM Trolleys and Cranes*

Call the CM distributor for descriptive literature, prices and fast delivery from stock.

CM HOISTS AND CHAIN

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COLUMBUS McKINNON CHAIN CORPORATION
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REGIONAL OFFICES: NEW YORK, CHICAGO, CLEVELAND
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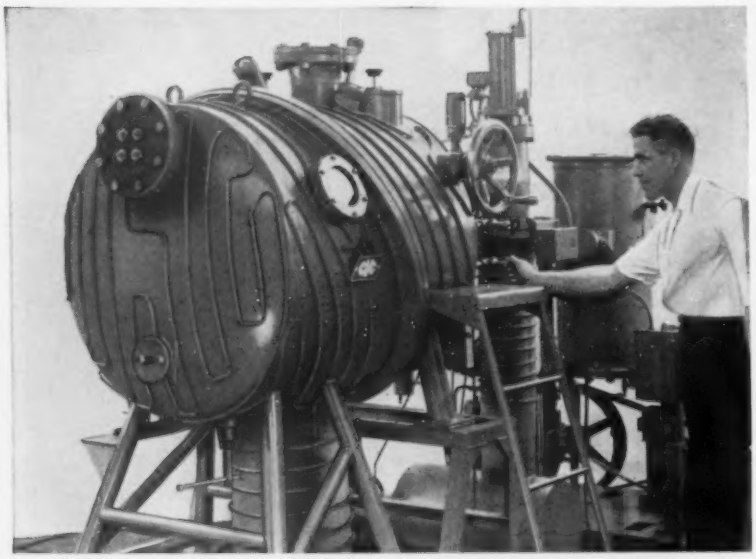


Process observation, alloy additions, pouring, temperature and pressure readings, high frequency control, valve sequencing—all focus around one center of operation.

Small but versatile

a high-vacuum furnace for lab and pilot plant

CVC's 5 to 50 pound melting and casting furnace offers:

Three-way casting: Melts of 5, 12, 17, 30, or 50 pounds can be cast in single or multiple molds—or centrifugally.

Ease of materials handling: All parts of the furnace interior are within arm's reach. The oblique angle flange connecting the chamber sections provides unusual vertical clearance for removing molds directly with a crane. A deep mold well provides 33" under the crucible lip for pouring bar-type ingots.

Complete controls: A manual bridge-breaker assembly is combined with a water-cooled, nonfogging sight tube for optical pyrometry. A sampling device and a thermocouple assembly are standard accessories. Interlocking of the pneumatic vacuum line valves makes for safe and proper cycling.

The mold well is water-cooled. Electric feedthroughs are provided for mold heating.

Ample pumping: A 2-stage diffusion-ejector pump brings the system swiftly to the low micron Hg pressure range, with plenty of reserve capacity for pressure surges from alloy additions, deoxidation, and pouring.

Write for illustrated bulletin No. 4-30 that lists complete specifications, accessories, and design features of this remarkably versatile furnace.

This view of the mold chamber shows deep well for single molds, indexed table for multiple molds (optional) and drive mechanism for centrifugal casting (optional).

CVC

Consolidated Vacuum
Rochester 3, N. Y.
a division of CONSOLIDATED ELECTRODYNAMICS CORPORATION, *Pasadena, California*

Sales Offices: Albuquerque • Atlanta • Boston • Buffalo • Chicago • Dallas Detroit • New York • Palo Alto • Pasadena • Philadelphia • Seattle • Washington, D. C.

anism requires slightly more than three seconds to cycle. The stack feed push bar completes its operation in about 2½ seconds. These various independent mechanical and hydraulic motions are electrically coordinated into a composite automatic cycle which requires five seconds. As a result, the press line turns out 12 wheel disks per minute. The timing is done as follows:

Operation must be started with all devices in their home positions. The presses must all be at top stroke. The stack feed push bar must be withdrawn. The transfer feed fingers must be unclamped and returned. If previous automatic operation was halted with the automatic stop button, all equipment will be in the home positions. Hydraulic pressures, lubrication oil pressures and air pressures to the clutches, brakes, counterbalance cylinders, and cushions must also be up to par before the control circuits will be operable. Selector switches on the four presses must be set to automatic operation.

Methods:

Gravity feed speeds order filling

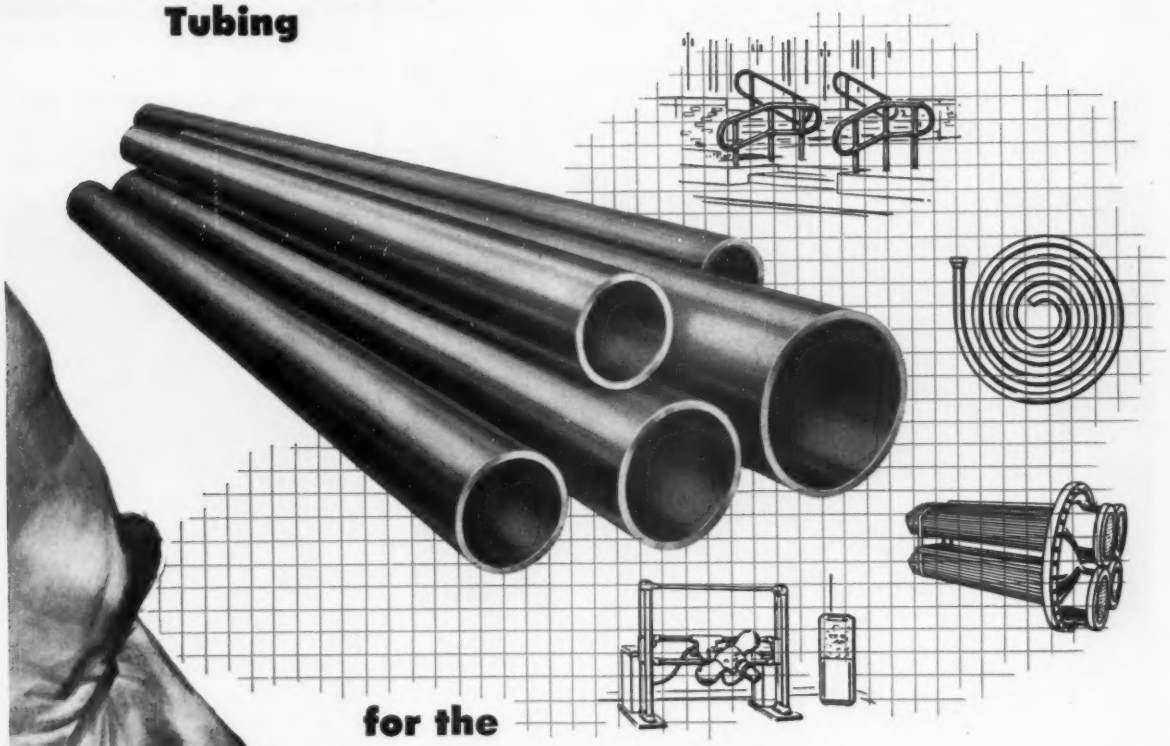
Nine 60 ft bays of inclined storage racks installed in its new distribution and steel storage building have reduced by 50 pct the aisle space required per front and improved shipping flow for Holo-Krome Screw Corp., hexagonal socket screw manufacturer of Hartford.

Gravity does the work in the system. Cases of pre-packed hex-socket screws are stored on inclined runners. When an order-picker removes the case he wants from the rack front, the cases behind slide down into front position, ready for picking.

No Traffic Jams

The racks, trade-named "Pick-A-Case," are loaded from behind. Cases are removed from the front. Traffic is stepped up because feed-

B&W Welded Stainless Tubing



for the

designer

...with a Critical Eye

The designer intent on developing a finer product at lower cost cannot afford to ignore the important design advantages inherent in B&W Stainless Welded Tubing:

- High strength-to-weight ratio
- Material, weight and space savings
- High resistance to corrosion and oxidation
- Ability to assume virtually any design shape without loss of structural advantages
- Improved product appearance
- Availability of a full range of types, grades, sizes and finishes to meet your requirements

Whatever your specific product requirements, B&W's wealth of experience in the manufacture of tubing for every type of application, assures you of Welded Stainless Tubing that is, in effect, custom-produced to your needs.

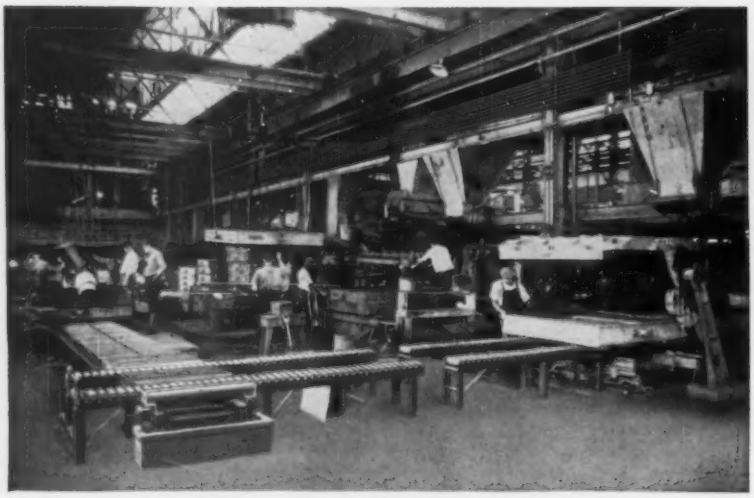
For help in choosing the *right tubing* for any specific job call in Mr. Tubes. He's your local representative of B&W's technical staff, regional sales offices, and a network of friendly tubing distributors. Take advantage of the extensive tubing knowledge he represents.

THE BABCOCK & WILCOX COMPANY
TUBULAR PRODUCTS DIVISION
Beaver Falls, Pa.—Seamless Tubing; Welded Stainless Steel Tubing
Alliance, Ohio—Welded Carbon Steel Tubing

B&W SEAMLESS and WELDED TUBES

TA-4039 (SWM)

Ask Standard how to cut costs with conveyors



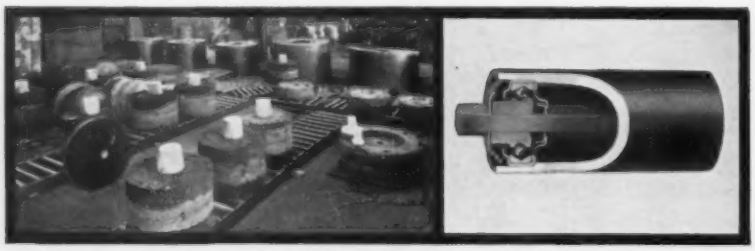
Parallel roller conveyor lines facilitate movement of large molds to pouring area. Note simple right angle transfer device.

Job-tailored conveyor systems speed, simplify foundry work

GOOD foundry practice requires smooth handling of molds and cores to reduce losses due to "shifting" or "collapse".

This can be achieved with Standard Gravity Roller and Power Conveyors. Standard's *50 years experience* in engineering and manufacturing *foundry conveyors* can be valuable to you.

Before you embark on any modernization program it will pay you to call STANDARD CONVEYOR COMPANY, General Offices, North St. Paul 9, Minn. Sales and Service in Principal cities.



Steel foundries handle cumbersome molds easily on simple low cost roller conveyors. Special design shielded bearings for rough foundry use give longer life, low maintenance.

Send for Standard's special catalog — a valuable reference book illustrating and describing various conveyor installations in leading foundries. Ask for "Conveyors for Foundries—M-2."

Standard 50 years of conveyor experience
GRAVITY & POWER
CONVEYORS
Sales and Service in Principal Cities.

ing and picking aisles function independently, without jams or interruptions.

Automatic stock rotation guarantees constant inventory turnover, an important consideration for this manufacturer.

Inclined racks "feed" new boxes as orders are filled.

Each 60 ft rack bay holds about 540 items. The installation affords 1085 fronts and was designed, fabricated, and installed by Artco Corp., Flourtown, Pa., manufacturer of "Rak-A-Tier" storage systems.

Machining:

Cam sprags are broached at 1000 per hr automatically.

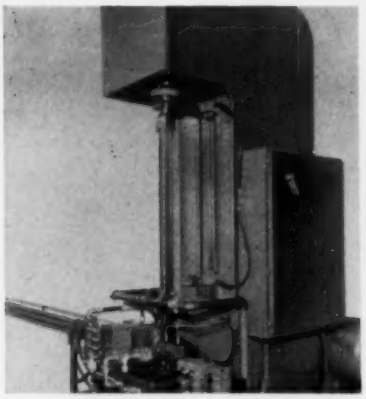
Twenty-four different sizes of cam sprags are automatically broached from two different sizes of steel cam section rod at a rate of 1000 per hr on the same automatic utility press in the plant of a large automotive parts supplier. The complete broaching installation, including the automatic handling, fixturing, broaches and the special PB 10 ton, 42 in. stroke utility press, was designed and made by Colonial Broach & Machine Co., Detroit.

Identical steps are broached at each end of the cam sprags to the specified cam and axial angular relationship, also to the specified radii at the junction of the two planes of the step. In practice, steps on adjacent ends are broached simultaneously, with the cut off section of the broach then severing the completed piece from the wire stock. Four rods are fed

at a time and a single pass of the broach completes four pieces.

Automatically Ejected

Stock 12 ft in length is fed horizontally from adjoining supporting racks. As the stock advances it automatically ejects the completed parts into a chute at the end of each cycle. Length on the parts varies from ½ in. to 1⅜ in. and is held within 0.005 in. tolerance. Angular relationship to the cam section of the wire stock is held within ± ½° on all sizes.

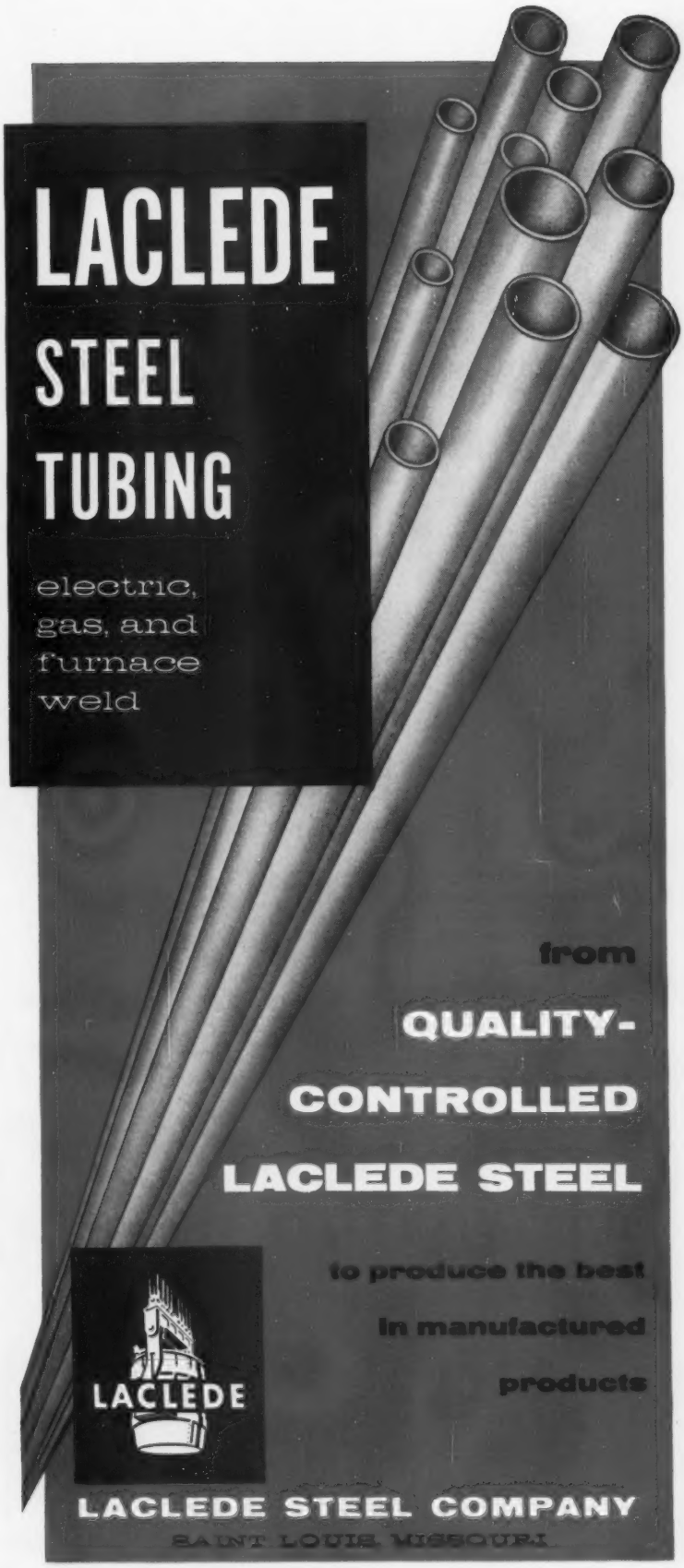


Unit feeds, broaches, and ejects four parts at a time.

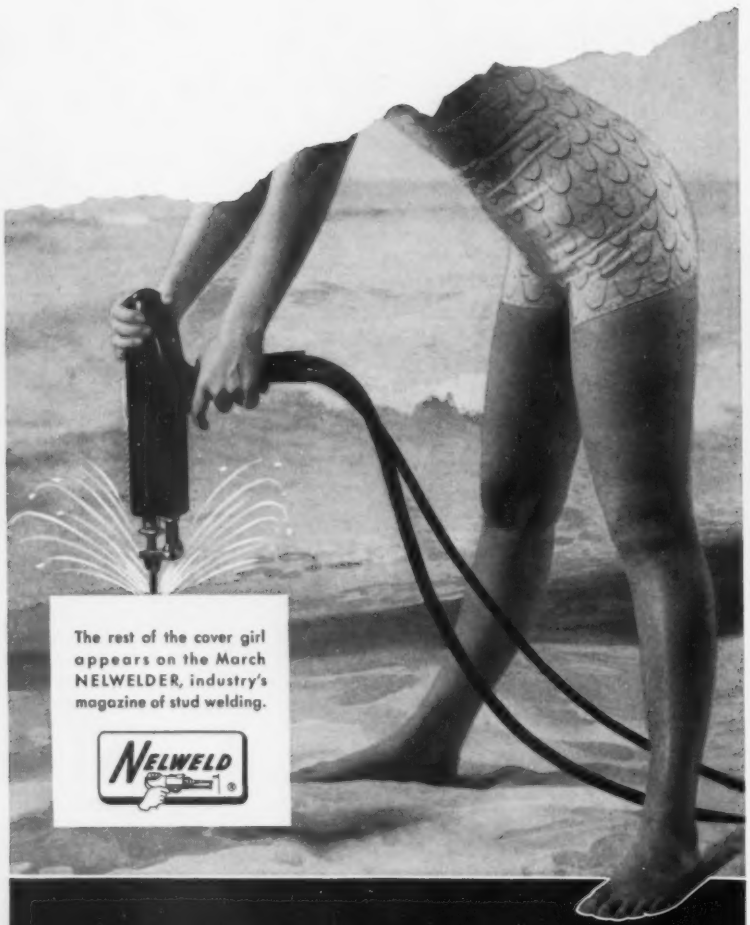
Minimum Changeover Time

Changing to either of the two cross section sizes of the cam wire requires only changing of the guide plates in the fixture, while changes in the steps simply require that the correct inserts be mounted in the broach bar. Since both the fixture and the broach bar are readily accessible for these changes a new part can be put into production with minimum changeover time. Change in length alone is even simpler since only the position of a set screw need be adjusted.

Automatic feeding and clamping of the stock are hydraulically actuated with complete safety interlocks being provided for the automatic broaching cycle. Whenever any one of the four 12 ft lengths of cam section wire stock is used up, the broach returns to the top of the stroke and the machine stops automatically.



JOT NAME, TITLE AND ADDRESS IN THIS SPACE
TO START YOUR FREE "NELWELDER" SUBSCRIPTION



another way of saying.. **STUD WELDING IMPROVES EXTERIOR DESIGN**

Product designers and architects can smooth out the contours of many a rough exterior by employing the NELWELD® method of fastening. Numerous innovations in stud fastening which eliminate unsightly projections such as bolt heads, and costly bosses and flanges, are published monthly in the NELWELDER. Get in the swim — mail the top of this advertisement to receive your first free issue of the NELWELDER.

NELSON STUD WELDING
Division of Gregory Industries, Inc.
LORAIN, OHIO

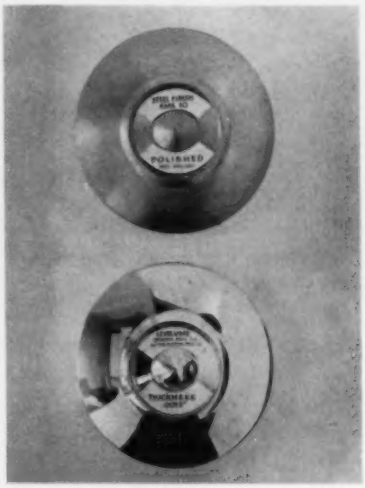
Plating:

Bright nickel process cited for high leveling and speed.

Commercial release of a new high-speed bright nickel plating process called Levelume has been announced by officials of Hanson-Van Winkle-Munning Co., Matawan, N. J., who developed the process.

It is described as the first bright nickel process to combine qualities of full brightness, high leveling and exceptional speed.

Field tested in several high-production installations, Levelume has reportedly shown deposition rates 100 pct higher than the fastest processes available today.



Auto hub caps, before (top) and after nickel electroplating.

It has enabled one of the nation's leading auto parts manufacturers to more than double its production without investing in new conveyors, enlarging tanks, changing racking methods or increasing the labor force. Savings in equipment have amounted to over $1 million.

Practically any existing nickel plating process can be converted to Levelume in a matter of a few days, according to H-VW-M. No special auxiliary equipment need be installed. Tanks only have to be cleaned and bleached. Almost any rubber-lined tank previously used can be employed.

Drilling:

Combined unit provides drilling, clad removal.

Glenn L. Martin, Baltimore, has developed a tool which drills holes and removes aluminum cladding from duralumin in one operation. This permits positive electrical connections to be made to aircraft structures. The tool consists of a drill attached to a standard wire brush.

One operation removal of aluminum clad from duralumin.

Design:

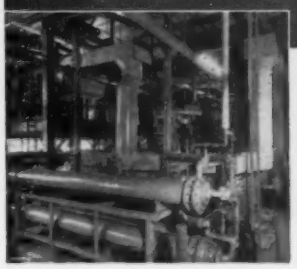
Contest begun on aluminum curtain wall design.

A $25,000 contest, soon to begin among the nation's architects, designers, draftsmen and architectural students, is directed toward developing new ideas in the design and construction of aluminum curtain walls for buildings. It is cosponsored by Aluminum Co. of America and the National Association of Architectural Metal Mfgrs.

For Alcoa's part, the contest is a means of broadening acceptance for this recently developed type of construction, and of giving increased impetus to the already strong trend toward aluminum in architecture.

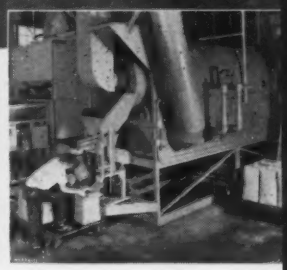
Programs providing full details of the contest were mailed to all contestants January 15, 1956. Further details can be obtained from Mr. Paul Schell, c/o NAAMM, 228 North LaSalle Street, Chicago.

PLATING 400,000 POUNDS A DAY WITH THIS **UDYLITE** MACHINE . . .



End view showing exhaust system and heat exchangers.

Unloading station of Udylite Automatic Barrel Machine.



Drum type dryer used for drying bright zinc plated work.

Harding Manufacturing Company are bright zinc plating 20,000 pounds of small parts per hour with their Udylite Full Automatic Barrel Plater and are running it 20 hours a day.

Only four men are used in operating this Udylite machine. One man loads the feeder hopper. One man loads the cylinders. One man unloads the cylinders and one man unloads the dryer and dichromating operation—*5,000 pounds of plating per man hour.*

And with this tremendous production is all the desired versatility. The machine is so designed with electrical controls that the plating time and thickness of plating in each cylinder load can differ from other loads going through the machine cycle at the same time. The plating time for each load is predetermined by the operator at the time the cylinder is loaded.

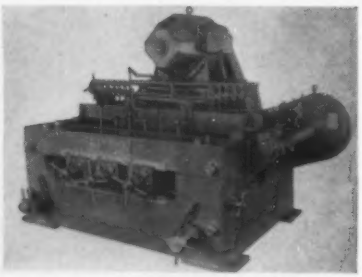
This is another example of Udylite experience in production plating. If you have a plating problem—large or small—it will pay you to consult Udylite.

THE Udylite CORPORATION
DETROIT 11, MICHIGAN

WORLD'S LARGEST PLATING SUPPLIER

NEW EQUIPMENT

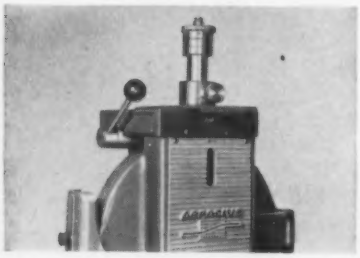
New and improved production ideas, equipment, services and methods described here offer production economies . . . for more data use the free postcard on page 109 or 110.



Unit polishes as it straightens cold drawn bars

Designed to polish as it straightens cold drawn bars of from ¾ in. to 4½ in. in diam, a new high-speed straightening and polishing machine is already installed in three steel mills. With a rated production speed of 300 fpm, the unit can incorporate entry and delivery tables for automatic handling of the drawn and sheared bars. A wide variety of grades can be straightened such as high or low carbons, Bessemer grades and different alloys with, the manufacturer reports, good end-to-end straightness and end product quality. *Sutton Eng. Co.*

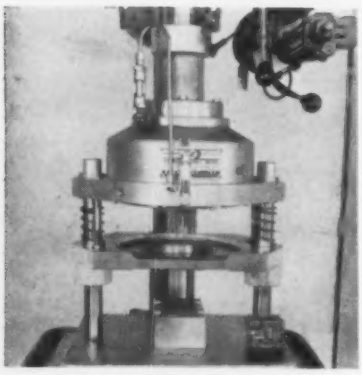
For more data circle No. 26 on postcard, p. 109



Built-in wheeldresser included on grinders

A machine tool manufacturer is now offering as optional equipment on the firm's line of precision surface grinders, a built-in hand-operated wheeldresser. Engineered to rigidly fit into the grinder head, the wheeldresser features a micrometer adjustment that accurately measures and controls the amount the wheel is dressed. With device, an operator can dress his wheel without having to disturb work or machine set up. Described as convenient, fast and economical. *Abrasive Machine Tool Co.*

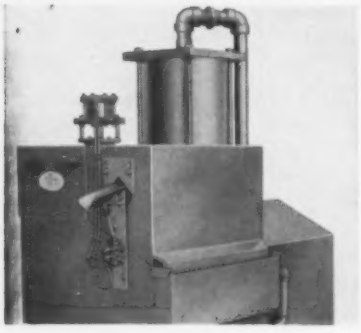
For more data circle No. 27 on postcard, p. 109



Drill heads designed for drilling printed circuits

A new series of gearless drill heads has been especially designed for drilling printed circuits. The tool has adapted Formica for use as guide and drive plates. The hole pattern of the printed circuit is drilled simultaneously in three Formica plates. The user can remove the plates, store for future use and replace with new hole patterns as required. Holes as close as 0.140 in. between spindles can be drilled. A rectangular pattern up to 6 in. x 14 in. is the capacity range. The series is not designed for large runs since a special head for long runs would ordinarily be economically possible. With drilling of printed circuits there is no shattering of the backboard and no bisecting of the circuit occurs. With this method, holes are drilled in less time. *Zager Tool, Inc.*

For more data circle No. 28 on postcard, p. 109



Billet descaler is self-contained and portable

Completely self-contained and portable, a new billet descaler employs a 2200 psi, triple nozzle water spray. The descaler requires only shop air for power, with no electric or water connections needed. In actual operation, the descaler is usually located adjacent to the hot forging press. A member of the forging crew inserts billets in the unit and the water spray is automatically released. Production capacity is rated at 240-360 billets per hr, for billets up to 6 in. in diam. Provisions are made for hand, conveyor or pusher loading. The unit is said to increase die life, reduce parts scrap and eliminate scale blowing time. The device is known as the Andersen Unit Descaler. *Richards Co.*

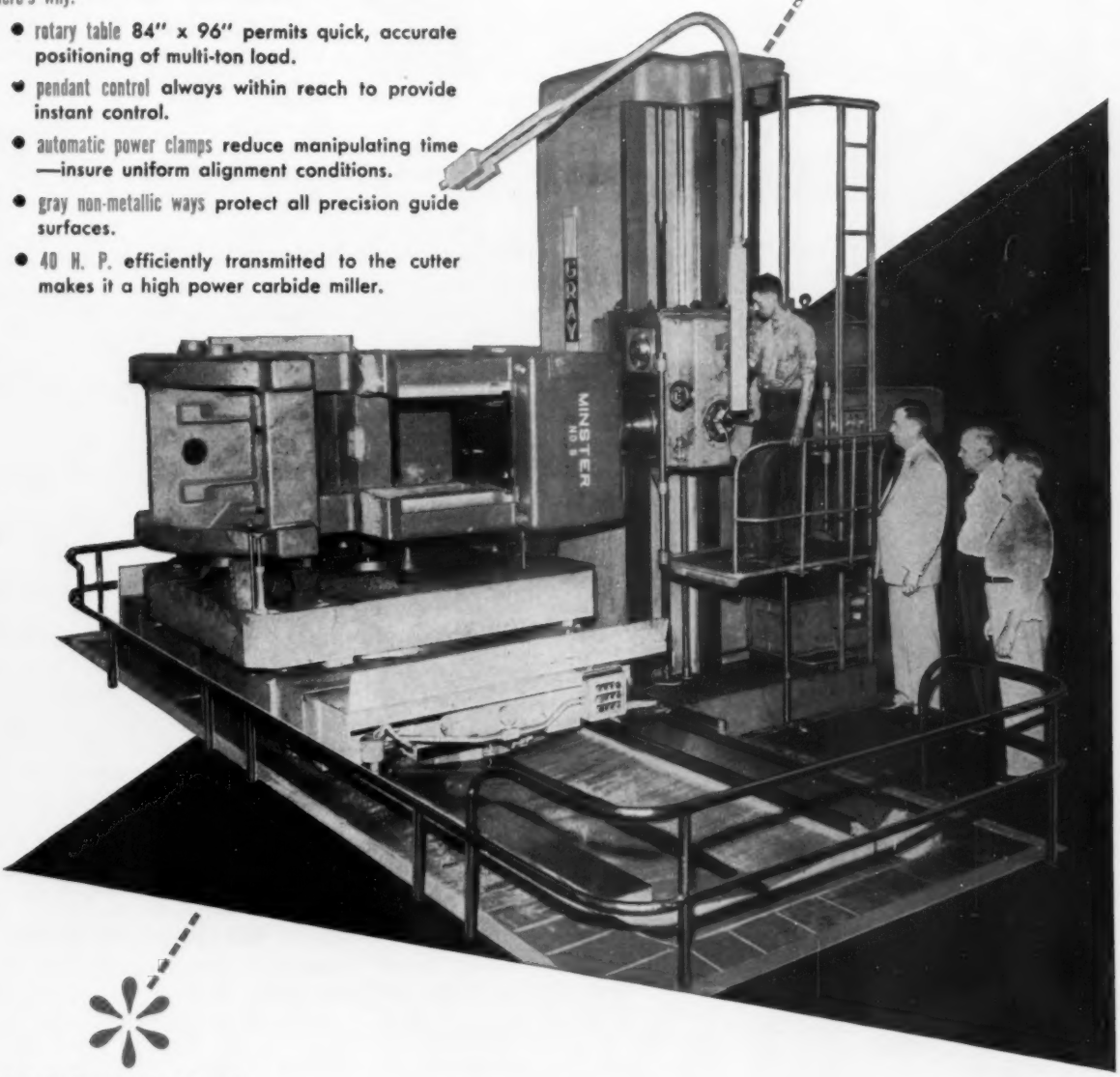
For more data circle No. 29 on postcard, p. 109

"Inside Story" on doubling production at the Minster Machine Co., Minster Ohio

This GRAY 6" PLANER TYPE BORING MILLING AND DRILLING MACHINE is really delivering "versatility with a punch."

Here's why:

- rotary table 84" x 96" permits quick, accurate positioning of multi-ton load.
- pendant control always within reach to provide instant control.
- automatic power clamps reduce manipulating time —insure uniform alignment conditions.
- gray non-metallic ways protect all precision guide surfaces.
- 40 H. P. efficiently transmitted to the cutter makes it a high power carbide miller.

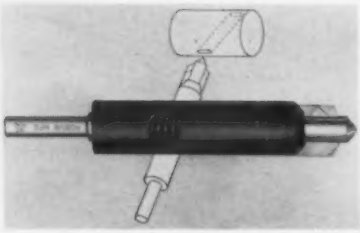


Production times have already been cut in half. Further savings are assured when they "open her up."

The G.A. GRAY Company

planers • milling planers
planer type milling machines
horizontal boring machines

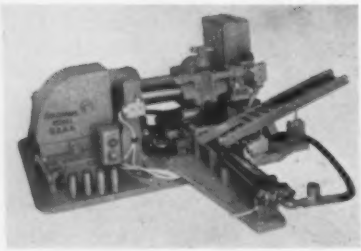
CINCINNATI 7, OHIO, U. S. A.
SOLD IN CANADA BY UPTON, BRADEEN AND JAMES, LTD. • SOLD IN LATIN AMERICA BY MACHINE AFFILIATES



Unit deburrs, chamfers holes not in singular plane

Irregular surface holes, developed when holes are drilled angularly presenting an elliptical surface configuration or where holes are drilled in a cylindrical body, are reportedly deburred and chamfered with a newly-designed tool. The unit, a self-piloted and two-lipped cutter which automatically accommodates and follows the hole surface geometry, is directed to enter approximately squarely to the hole, without regard to the true axis of the hole. Named the Ellipiti-Burr. *Nobur Mfg. Co.*

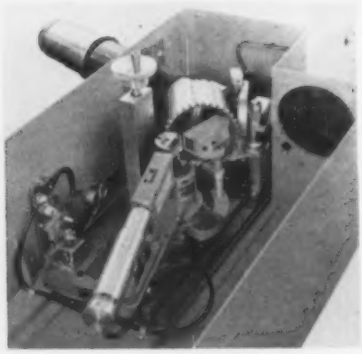
For more data circle No. 30 on postcard, p. 109



Marking machine features "jet of air" for positioning

An automatic motor driven marking machine is offered which features a "jet of air" to position the work and then to eject the work after marking. The unit is constructed for marking steel parts such as bushings, collars, gages, rings, sleeves, taps, mills, drills and other cylindrical or tubular type parts. It has a 7 in. stroke and has been manufactured to mark parts up to 2 in. in diam in the standard machine, or larger when the oversize frame is used. *The Acromark Co.*

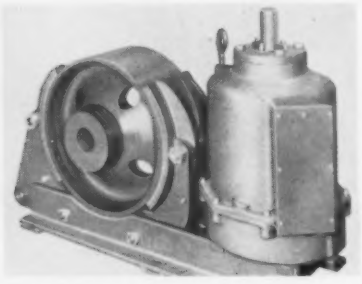
For more data circle No. 31 on postcard, p. 109



New X-ray unit analyzes plating on bearings

A new X-ray bearing analyzer, designed specifically for quantitative analysis of lead-tin alloy platings on crankshaft bearings has been developed. Using the principle of the X-ray spectrograph, the new instrument quantitatively analyzes platings on the interior surface of such cylindrical bearings with an accuracy of 1 pct for lead and 1 pct for tin. Average time for analysis is reported as 90 seconds. As bearing is rotated mechanically, beam from an X-ray tube strikes central interior surface area at an oblique angle. This causes plating to fluoresce and produce secondary radiation whose characteristics are influenced by the amount of lead and tin in the plating. Unit measures approx. 36 in. x 18 in. x 12 in. Power can come from 110 v, ac supply. *North American Phillips Co.*

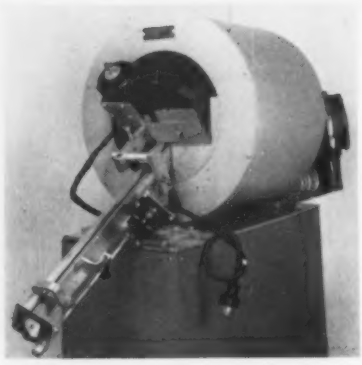
For more data circle No. 32 on postcard, p. 109



Magnetic brake eliminates need for adjustments

A dc magnetic brake (Type SA) that eliminates all need for adjustment throughout its service life is now available. Regardless of lining wear or wheel expansion, the brake shoe remains in correct adjustment and proper alignment with the wheel; once the correct torque setting is made for a given application, it need never be changed. By not permitting shoe tips to drag, the self-aligning feature provides for even lining wear and increases lining life. Wheel wear and scoring are also minimized. *Westinghouse Electric Corp.*

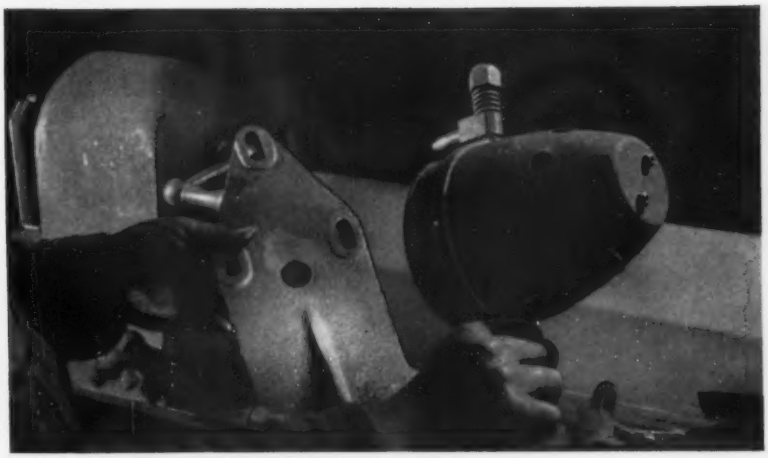
For more data circle No. 33 on postcard, p. 109



Small-parts feeding hopper has speed, versatility

Called the Feed-A-Matic, a new unit is designed to integrate the feeding of small component parts and units into manufacturing operations. It is engineered to give a complete and guaranteed feeding cycle, delivering the required unit to the point of use at high rates of speed. In addition to orientation, feeding and positive delivery of small parts, the unit can provide either mechanical or electronic counting and release of a predetermined quantity of units at speeds up to 200,000 units per hr. Unit consists of metal barrel with cast-in pockets. Parts being fed are captured in pockets as barrel revolves and carried to top of the hopper. Here, parts are allowed to flow down chute for feeding to delivery point. Those not orientated are rejected. *U. S. Eng. Co.*

For more data circle No. 34 on postcard, p. 109

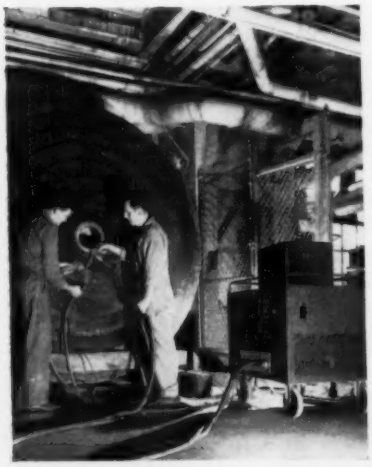


Using Invisible Light to Find Invisible Cracks

A Peoria, Illinois foundry uses Magnaglo and "black light" to make any possible cracks on castings show up as glowing indications. Detection of flaws in the "rough" state means no wasted time in finishing defective castings. Early detection also makes the cause of defects easier to spot and correct. Result? Consistent quality and lasting customer satisfaction.

Inspection Methods: Case Studies

Lower Overall Production Costs Through Nondestructive Testing



Spotting Trouble Before It Happens

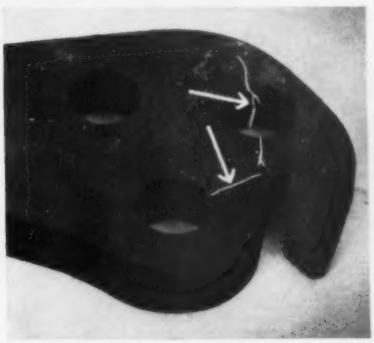
At the Bakelite Company plant in Bound Brook, N. J., inspecting reaction tanks is like seeing your dentist—should be done twice a year. A portable Magnaflux inspection unit is used to find cracked welds in tanks used in making the intermediate resins which go into Bakelite phenolic plastics.

Most manufacturers can achieve definite, worthwhile savings by employing one of the ⋈ methods for improved production control. These nondestructive inspection methods include: Magnaflux, for wet or dry magnetic particle inspection; Magnaglo, fluorescent particle inspection; Magnatest, eddy current electronic testing; Zyglo, fluorescent penetrant inspection; Spotcheck, dye penetrant inspection; and, Sonizon, for ultrasonic measurements.

The ⋈ testing methods are equally effective for preventative maintenance or manufacturing inspection.

Most manufactured products have as one, or more, of their components some type of casting, forging weldment, machined or formed part. Where cracks cannot be tolerated in the final product, maximum production economy must be obtained from the very outset. Flaws must be discovered as early as possible in order to eliminate further wasted effort in final processing or assembly.

Magnaflux methods pinpoint early flaws and help you eliminate their cause. This results in savings of time, labor and additional long range benefits from increased salvage and reduced amounts of scrap. For detailed information as to how one of the ⋈ inspection methods can help you produce better and save more, write or call for an interview with a Magnaflux engineer. No obligation, of course!



Heat Cracked the Jaw

The jaws of steel strapping machines must be reliable. Yet, following the heat treating, invisible cracks were discovered with Magnaglo as shown above. Immediate correction of the heat treat cycle eliminated the cracks. No further machine time or labor was expended on defective jaw parts.

Watching Your Weight

can be important—especially in the aircraft industry. Excess weight can reduce the range and payload of a plane. A major aircraft manufacturer uses ⋈ Sonizon units to ultrasonically measure thickness of sheet and formed shapes. This controls weight by eliminating excessive thickness.

MAGNAFLUX CORPORATION

Write for complete details concerning any of the above case studies, (excerpts from MAGNAFACTS), or ask for our new booklet on Lower Manufacturing Costs.

Take Your Inspection Problems to the House of Answers . . .

MAGNAFLUX CORPORATION

7302 W. Lawrence Avenue • Chicago 31, Illinois

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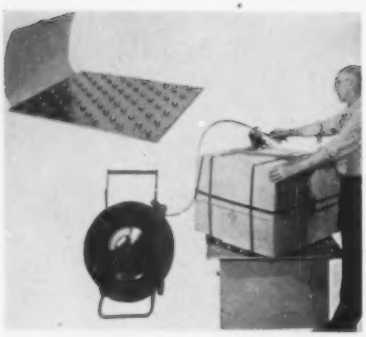
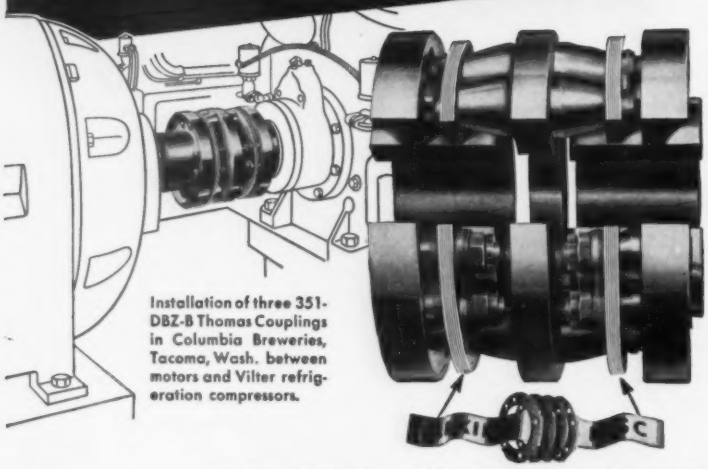


Strapping table top facilitates packing

A table top for strapping enables an operator to stand in one position while rotating heavy containers for packing or strapping. The unit is extremely versatile and may be mounted on a permanent or portable base or in conveyor lines. A metal strap guide can be used as optional equipment to facilitate feeding the strap. The table top is constructed of metal clad Haskelite and contains 61 one-inch ball casters. These easy-rolling casters extend ¾ in. above the table surface and are mounted in a staggered pattern on 3 in. centers. The unit measures 36 in. wide by 36 in. long and is 1½ in. high. Gross weight of the unit is listed as 37 lb. Optional strap guide is available. *Signode Steel Strapping Co.*

For more data circle No. 35 on postcard, p. 109

THOMAS FLEXIBLE COUPLINGS...
for more years of better service!

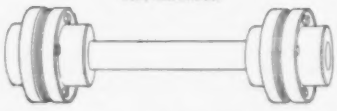


Installation of three 351-DBZ-B Thomas Couplings in Columbia Breweries, Tacoma, Wash. between motors and Vilter refrigeration compressors.

Patented Flexible Disc Rings of special steel transmit the power and provide for parallel and angular misalignment as well as free end float.

DISTINCTIVE ADVANTAGES	
FACTS	EXPLANATION
NO MAINTENANCE	Requires No Attention. Visual Inspection While Operating.
NO LUBRICATION	No Wearing Parts. Freedom from Shut-downs.
NO BACKLASH	No Loose Parts. All Parts Solidly Bolted.
CAN NOT "CREATE" THRUST	Free End Float under Load and Misalignment. No Rubbing Action to cause Axial Movement.
PERMANENT TORSIONAL CHARACTERISTICS	Drives Like a Solid Coupling. Elastic Constant Does Not Change. Original Balance is Maintained.

Thomas Couplings are made for a wide range of speeds, horsepower and shaft sizes and can be assembled or disassembled without disturbing the connected machines, except in rare instances.



THOMAS

Write for our new Engineering Catalog No. 51A

THOMAS FLEXIBLE COUPLING COMPANY
Largest Exclusive Coupling Manufacturer in the World
WARREN, PENNSYLVANIA, U.S.A.

Disintegrator

A new type of metal disintegrating machine, known as Model B-1, quickly and completely removes broken taps, drills and other tool

parts fast and efficiently. The unit features a self-contained cabinet wired for 110 v, 220 v or 440 v. *Jiffy Disintegrators.*

For more data circle No. 36 on postcard, p. 109

Helmet liner

A new cold weather helmet liner for outdoor workers is described as so moderate in cost it may be discarded when soiled. The one-piece liner is made of a special twill fabric interwoven on the inside with warm fleece. Cut to give maximum coverage of the head and ears, the liner has straps on top which tie on the helmet harness to prevent it from falling or blowing off. Other features are reinforced seams and an adjustable snap-on chin strap. *General Scientific Equipment Co.*

For more data circle No. 37 on postcard, p. 109

Grinding spindle

A new grinding spindle set-up is made with spindle only and the flexible shaft motive power is not coupled until ready to grind. Available in three sizes for grinding

wheels up to 5 in. in diameter, each size has attachment for snapping on and off the shaft of a flexible shaft grinder. *Wyzenbeek and Staff, Inc.*

For more data circle No. 38 on postcard, p. 109

Vertical miller

A new overarm vertical milling machine was developed to mill, drill and bore with accuracy, speed and economy. Its "big caliber" is said to be derived from the sliding overarm. Its square design reportedly gives more rigidity with greater accuracy. The unit pro-

vides extra range and capacity, more usable working space, versatility in set-up and more power at the cutter. Speed range with nine changes makes possible the use of high speed or carbide tipped cutters to the best advantage. *Index Machine Co.*

For more data circle No. 39 on postcard, p. 109

Belt grinders

Four improved models of a 2½ in. belt grinder feature new rubber contact wheels and improved belt alignment. The new contact wheels are described as enabling the user to obtain a better finish in less time, while providing increased life for abrasive belts. Hubs are designed to accommodate standard tires 2½ in. wide and 6 in. in diameter so that tires may be easily replaced. For easier and more accurate belt alignment, the standard back stand idler units in the new models are designed to make possible lateral adjustment of the drum. *Delta Power Tool Div., Rockwell Mfg. Co.*

For more data circle No. 40 on postcard, p. 109

March 19-23
See the
Blue Ribbon Winners of 1956
The 453 selected
TOOLING CHAMPIONS
plus 27,898 runners-up
The best and latest in tools, machines, inspection equipment, automation devices, controls and accessories to cut costs and boost profits—many never before shown anywhere.
For the small plant
For the intermediate plant
For the big plant
See them at ASTE's Greatest Show
1956 ASTE INDUSTRIAL EXPOSITION
International Amphitheatre
CHICAGO, ILLINOIS
MARCH 19-23, 1956
Sponsored by the 32,000 men responsible for designing and selecting the best in production equipment. Write for advance registration blank today.
Equally important, plan to attend the 5-day, all-industry conference covering the latest developments in manufacturing techniques and equipment.
AMERICAN SOCIETY OF TOOL ENGINEERS
10700 Puritan
Detroit 38, Michigan

Vacuum cleaner

A new vacuum cleaner for users in the industrial fields is described as featuring light weight, mobility and power. The plant aid is equipped with its own specially-designed universal motor which is sealed against dirt and water. This motor provides unusual cleaning power and can rapidly remove up to 3¾ gal of liquid or ⅞ bushels of dry material before emptying is necessary. Easily maneuverable, the unit has large 8 in. rubber wheels and a caster in front which permits easy rolling as well as stability when moving over rough floors. Can be converted into a powerful blower. *Black & Decker Mfg. Co.*

For more data circle No. 41 on postcard, p. 109

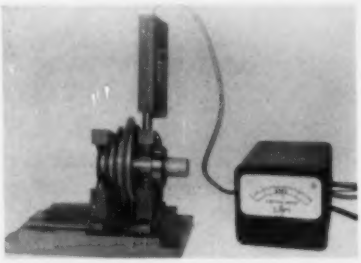
Aluminum-clad steel wire

Facilities are now turning out hot-dipped aluminum-clad steel wire in one manufacturer's plant. The new equipment is capable of producing aluminum-clad wire in sizes ranging from 6 to 18 gage in either 16 in. or 22 in. diam coils. The aluminum coatings produced by this firm's line are described as highly ductile as measured by well-known standard procedures of testing. Reportedly they have exceptional smoothness and luster. *American Steel and Wire Div., U. S. Steel Corp.*

For more data circle No. 42 on postcard, p. 109

Electronic micrometer

A new electronic micrometer is described as able to check 3500 pieces an hour at tolerances less than 0.0001 in. The unit, for the machine tool trades, features two sets of adjustable anvils for accepting a production run for quick checking without feel. This permits gage stand to be pre-set and locked to conform to a master. Pieces, then, are inserted and position of the indicator noted. Diameter, concentricity and taper are quickly found. *Industrial Gauges Corp.*



For more data circle No. 43 on postcard, p. 109

LOWER COST EASIER FABRICATING

IngAclad STAINLESS-CLAD STEEL

With its standard cladding of 20% solid stainless inseparably bonded to an 80% backing of carbon steel, IngAclad costs substantially less than solid stainless.

Easier to fabricate, too. Can be bent, twisted, punched, formed, drawn—yet requires no special equipment.

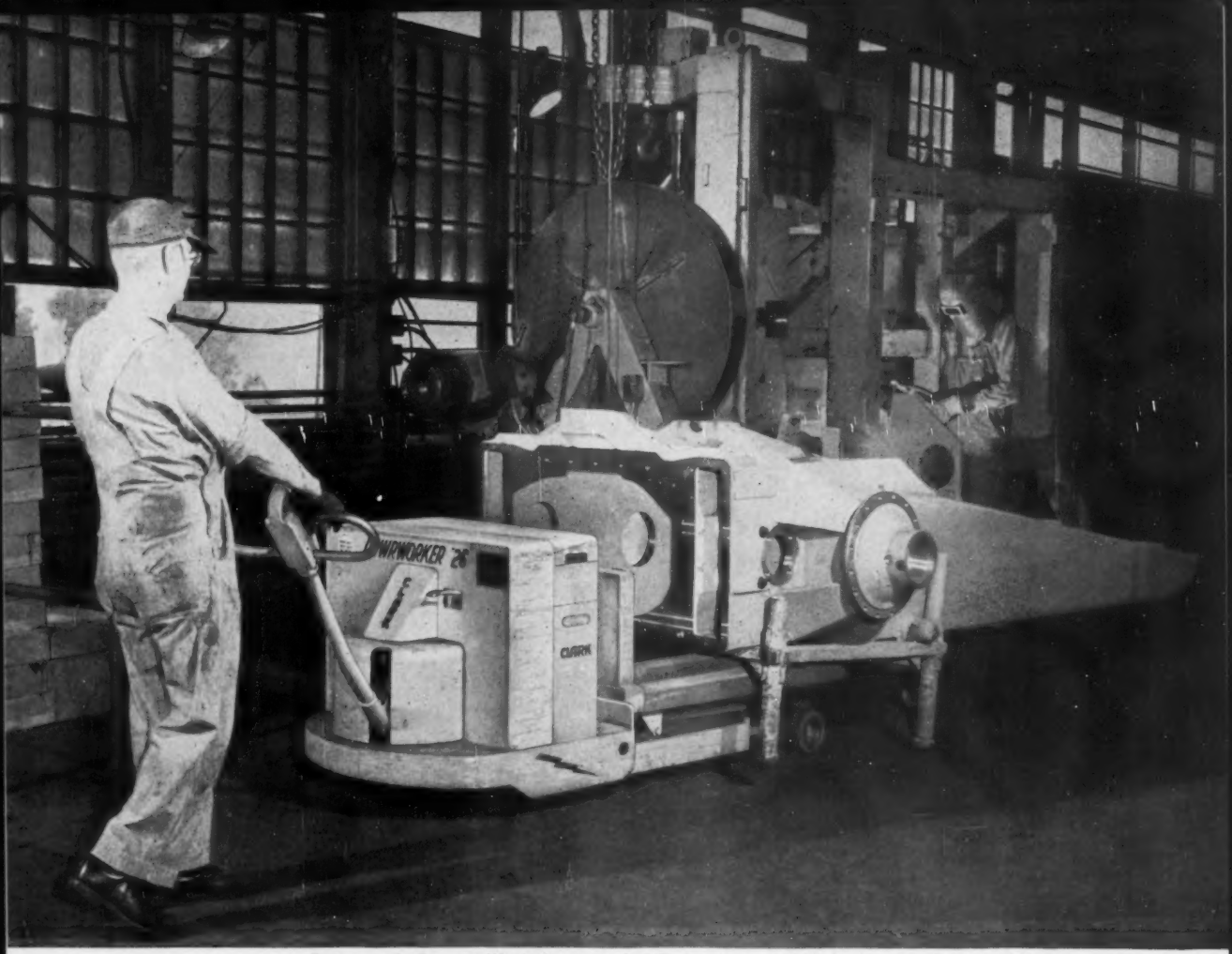
Plus—all the corrosion resistance and protective properties of solid stainless on the clad side.

See how IngAclad may be the answer to *your* stainless cost problems. Write, wire or phone for details.

INGERSOLL STEEL B-W BORG-WARNER

Ingersoll STEEL DIVISION BORG-WARNER CORPORATION

310 S. Michigan Avenue • Chicago 4, Illinois • Plant: New Castle, Indiana



One reason Le Tourneau-Westinghouse specified Clark is the dependable local service offered by R. E. Common Equipment Co., Peoria. It's typical of *all* Clark dealers. It's smart business to do business—locally.

CLARK *POWRWORKER*®
at LE TOURNEAU-WESTINGHOUSE

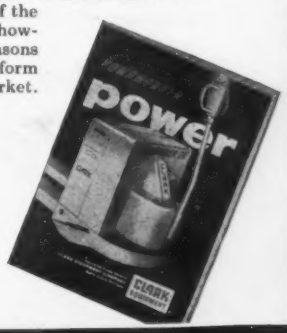
"It takes more than features . . ."

Truck features are important. Fact is the Powrworker gives you more features than any other powered hand truck.

BUT PERFORMANCE DOESN'T *JUST* DEPEND ON FEATURES. How about a year from now, or two years, or five? That's when you depend on service—fast, local service.

And that's where your local Clark dealer comes in. Clark dealers have the largest supply of service parts in the industry—genuine Clark parts that are warranted and guaranteed for quality. He has factory trained men who *know* your machines. He provides prompt mobile service for emergencies, preventative maintenance right in your own plant, a completely equipped shop for rebuilding, and a fleet of rental trucks to help you over peak work loads. Here, is a *complete* service package.

SEE THE BONUS FEATURES of the Powrworker. Send for your copy of the new 16 page Powrworker booklet showing full details, cut-away views, reasons why the Powrworker will outperform any competitive machine on the market.



DON'T MISS THE MATERIAL HANDLING SHOW, JUNE 5-8, CLEVELAND, OHIO!

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POWRWORKER SECTION, Industrial Truck Division
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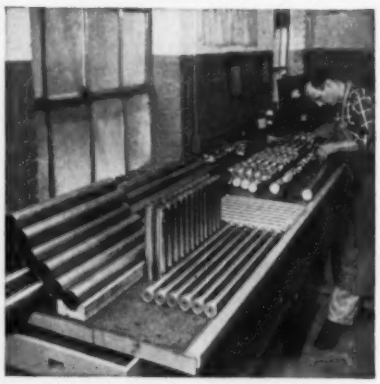
SUPERIOR TUBING acts as a temperature and mechanical handling shield for delicate sub-surface, radioactive logging instruments.

SMOOTH SURFACES, CLOSE TOLERANCES, LIGHT WEIGHT: REASONS WHY SUPERIOR TUBING IS USED TO HOUSE THESE DELICATE WELL SURVEYING INSTRUMENTS

Well Surveys of Tulsa, Okla., purchases Superior Seamless Type 304 Stainless Tubing in large OD, light wall sizes and in 63 in. lengths. Into these tubes, which in the finished state vary from 28 to 31 in., radioactive well-logging instruments are inserted—instruments so delicate that stray electrical waves or gases leaking into the casing may throw them off.

For that reason, the tubing is supplied in the "as drawn" condition, with a smooth surface that has a high radiation factor. Stainless is specified because plated material used in the past flaked off and short-circuited the instruments. The thin wall size (2.098" x .018" wall) is important; first, because of weight and, second, because of the close fit demanded. After the instruments are inserted, the tubing—closed by spinning—goes into an outer housing which must withstand pressures of 20,000 psi.

Whatever you want tubing for—an instrument housing, hypodermic needle, radio antenna, or heat exchanger—you'll find that the high quality of Superior tubing saves you time, money and production headaches. Send for your free copy of Bulletin 40—*A Guide to the Selection and Application of Superior Tubing*. SUPERIOR TUBE COMPANY, 2004 Germantown Ave., Norristown, Pa. *On the West Coast:* Pacific Tube Co., 5710 Smithway St., Los Angeles 22, Calif.



PRE-TESTING an assembly before it is inserted into the Superior tube.

Superior Tube

The big name in small tubing

All analyses .010" to ⅝" OD
Certain analyses in light walls up to 2½" OD

The Iron Age SUMMARY . . .

Tough sledding ahead for steel consumers and producers . . . Detroit steel buyers are playing it close to vest . . . Mills up against maintenance problems.

The Hard Way . . . Steel producers and consumers are learning the hard way that a few order cancellations are not enough to kill a strong market. Both now realize they face tough sledding in coming months.

Some mills which had overbooked in the belief that the market would ease are now regretting their haste. An about-face in consumer thinking means there will be carryovers instead of catching up with delivery promises.

Many producers are coming to realize what's behind the short tempers of their customers. The shortage of some steel products—particularly structurals—is interfering with steel expansion programs. The mills and their contractors are forced to compete with their own customers for a share of these products.

The Auto Story . . . Buyers for automotive companies are trying to play it close to the vest. But even so, some of them are busy reinstating orders previously cancelled. Their problem is to balance inventory against sales of 1956 models, so that they can come out fairly even before 1957 model production gets underway. Basic engineering changes in the new models will make some sizes used in the 1956 cars unusable in the 1957 variety after model changeovers.

THE IRON AGE has learned that Detroit and other auto centers are expected to step up their sheet and bar orders for May and June. That's why some steel people are afraid they might be oversold again for second quarter.

If the market eases in third quarter, as some expect, the mills will welcome the breathing spell. It's not that they favor a drop-off in business. A slowdown will give them a chance to get in some much-needed maintenance work. The fast pace of 1955 and 1956 to date has forced them to rely on emergency maintenance that merely postpones the inevitable.

A Rosy View . . . From a strictly business standpoint—ignoring the steel labor question—the outlook for steel is getting rosier by the day. Construction is going to be better than it looked several months ago. Private home building, particularly. Requirements for the highway program will be terrific. Freight car building is another heavy steel consumer. Oil and gas expansion, the former being spurred by concern over the Middle Eastern oil situation, is drawing the strings tighter on oil country goods, drill pipe, and line pipe.

Steel Output, Operating Rates

Production	This Week	Last Week	Month Ago	Year Ago
(Net tons, 000 omitted)	2,536	2,536	2,413	2,171
Ingot Index				
(1947-1949=100)	151.4	151.4	150.0	135.0
Operating Rates				
Chicago	98.0	98.5*	100.5	91.0
Pittsburgh	102.0	103.0*	101.0	90.0
Philadelphia	104.0	103.0	100.0	84.0
Valley	98.0	98.0*	98.0	89.0
West	101.0	103.0*	104.5	92.5
Detroit	106.0	104.0	106.0	93.0
Buffalo	105.0	105.0	105.0	100.0
Cleveland	106.0	109.0	97.0	95.5
Birmingham	95.0	96.5	97.0	86.5
S. Ohio River	97.0	91.0	95.0	83.5
Wheeling	104.0	104.0*	104.0	98.0
St. Louis	106.0	104.0	99.0	102.0
Northeast	85.0	85.0	88.0	87.0
Aggregate	99.0	99.0	100.0	90.0

*Revised

Prices At A Glance

(cents per lb unless otherwise noted)	This Week	Week Ago	Month Ago	Year Ago
Composite price				
Finished Steel, base	5.174	5.174	5.174	4.797
Pig Iron (Gross Ton)	$59.09	$59.09	$59.09	$56.59
Scrap, No. 1 hvy (gross ton)	$48.67	$49.00	$50.83	$37.00
Nonferrous				
Aluminum ingot	24.40	24.40	24.40	23.20
Copper, electrolytic	46.00	43.00	43.00	33.00
Lead, St. Louis	15.80	15.80	15.80	14.80
Magnesium	33.25	33.25	33.25	27.75
Nickel, electrolytic	64.50	64.50	64.50	67.67
Tin, Straits, N. Y.	101.00	99.00	104.00	90.125
Zinc, E. St. Louis	13.50	13.50	13.50	11.50

Steel Output To Hit New High

Iron Age Editor-in-Chief sees 1956 steel output at record level . . . Says production may hit 120 million tons . . . Predicts auto sales will show spurt this spring.

◆ STEEL OUTPUT this year will exceed last year's record of 117 million tons. By year's end, production may hit 120 million tons.

This forecast on 1956 steelmaking activity was made by IRON AGE Editor-in-Chief Tom Campbell in an address before a Cleveland business group.

In citing present steelmaking trends, Mr. Campbell notes that the current steel expansion program will just about keep up with expected steel demand over the next several years.

"That means," he says, "that as soon as one program is completed another one will be under way. The annual increase will be more than 4 million tons a year."

On the question of auto sales, THE IRON AGE editor-in-chief figures that they will pick up substantially in April and May with the result that auto firms will be upping their steel and component parts orders by that time. But he contends that the auto cutback picture has been overplayed in its relation to the economy as a whole.

Price increases in extras applicable to nickel, monel, inconel, and stainless-clad steel plate have been announced by Lukens Steel Co., Coatesville, Pa.

The increases are effective on all shipments made on or after Feb. 15. A company spokesman states that the increases will amount to approximately 2 pct. The extra changes do not affect the base price of the firm's clad steel.

THE IRON AGE issue of Feb. 23 will not feature ferroalloy prices. These listings will appear again, however, in the following issue.

SHEETS AND STRIP . . . Indications in **Detroit** are that automotive customers in some cases want to get back small tonnages of sheet and strip they turned down earlier. But mills point out that this can't be done now because this steel has already been redistributed to other consumers. Further bolstering of this fact comes from **Cleveland** where the only automotive cutbacks not being gobbled up by other steel-hungry consumers as fast as available are stainless for automotive trim. Appliance makers generally are keeping up their acceptance of sheets and there are indications that increased tonnage will be sought for the third quarter by a major washing machine fabricator. Some producers feel that there's a considerable bulge in their order books due to price-strike hedge buying on the part of many customers. And, they point out, they don't blame customers for thinking along these lines. In **Chicago**, mills are now beginning to admit that they'll have delivery carryover problems on sheet and strip during second quarter. Despite rigid precautions, some producers have tended to overbook second quarter sheet orders on the theory that automotive demand would fall off. The situation is such at the moment that some mills now admit that there will again be delivery carryovers from April into May. Pressure for sheet from appliance, farm equipment, warehouse, and auto makers continues without letup. Some Chicago producers point out that components fabricators of automotive parts in the area are pressing for heavier shipments of flat-rolled.

Purchasing Agent's Checklist

EQUIPMENT: What Westinghouse strike means to customers . . . p. 54

NICKEL: Will shortage ever ease . . . . . p. 47

TOOLS: Powder-actuated models gain . . . . . p. 49

STEEL: New carburizing series for critical gearing . . . . . p. 96

TINPLATE . . . In **Chicago**, customer demand for this product is running about normal for the season. Mills, however, are looking for substantial customer buying to keep up well through the first half. Strong tinplate buying is predicated on heavy can consumption throughout the nation this year. At present, tinplate receipts are going directly onto production lines with little or no stockpiling possible.

BARS . . . Plain carbon bars are still very much in demand in **Detroit.** May allotments by the millls will be made next week and it's expected that hard-pressed customers will take all they can get. In **Chicago,** while most categories of bar stock are moving somewhat easier than most other products at the moment, there's still plenty of customer pressure for certain items. Mills admit that cold-finishers are pressing for heavier shipments of hot-rolled stock. And, cold-finishers themselves say they've got more business than they can handle.

PLATE . . . Light gage plate is particularly tight in **Detroit** and consumer demands show little signs of letup. **Chicago** mills, already tied up on plate commitments for the balance of the year, have a new source of demand to think about. There's a new trans-plains area pipeline project lined up for this summer which means further pressure for plate. Also, tank fabricators report full order books and these consumers are pressing for lots of hot top quality steel badly needed for a number of high pressure tank applications.

STRUCTURALS . . . Virtually all market areas report continuous shortages, especially in wide-flange beams. **West Coast** mills are already booked well into second quarter, report demand is industry-wide. Structural backlogs are out 10 to 18 months in **Chicago** with mills reporting demand for fabricated structurals still rising.

PIPE AND TUBING . . . The **far-west** may get a new seamless steel pipe plant. Plans are under way by Associated Piping Co., Compton, Calif., for a Salt Lake City-area plant to cost over $500,000. It will be a semi-automatic manufacturing unit producing sizes from 2½ to 24 in.

IRON ORE . . . Jones & Laughlin Steel Corp., **Pittsburgh,** has taken an option on a large deposit of iron ore in Quebec, Canada, which it will explore over the next two years.

Comparison of Prices

(Effective Feb. 21, 1956)

Steel prices on this page are the average of various f.o.b. quotations of major producing areas: Pittsburgh, Chicago, Gary, Cleveland, Youngstown.

Price advances over previous week are printed in Heavy Type; declines appear in *Italics*.

	Feb. 21 1956	Feb. 14 1956	Jan. 24 1956	Feb. 22 1955
Flat-Rolled Steel: (per pound)				
Hot-rolled Sheets	4.325¢	4.325¢	4.325¢	4.05¢
Cold-rolled sheets	5.325	5.325	5.325	4.95
Galvanized sheets (10 ga.)	5.85	5.85	5.85	5.45
Hot-rolled strip	4.325	4.325	4.325	4.05
Cold-rolled strip	6.29	6.29	6.29	5.79
Plate	4.52	4.52	4.52	4.225
Plates, wrought iron	10.40	10.40	10.40	9.30
Stainl's C-R strip (No. 302)	44.50	44.50	44.50	42.00
Tin and Terneplate: (per base box)				
Tinplate (1.50 lb.) cokes	$9.05	$9.05	$9.05	$9.05
Tinplate, electro (0.50 lb.)	7.75	7.75	7.75	7.75
Special coated mfg. ternes	7.85	7.85	7.85	7.85
Bars and Shapes: (per pound)				
Merchant bars	4.65¢	4.65¢	4.65¢	4.30¢
Cold finished bars	5.90	5.90	5.90	5.40
Alloy bars	5.65	5.65	5.65	5.075
Structural shapes	4.60	4.60	4.60	4.25
Stainless bars (No. 302)	38.25	38.25	38.25	35.50
Wrought iron bars	11.50	11.50	11.50	10.40
Wire: (per pound)				
Bright wire	6.25¢	6.25¢	6.25¢	5.75¢
Rails: (per 100 lb.)				
Heavy rails	$4.725	$4.725	$4.725	$4.45
Light rails	5.65	5.65	5.65	5.35
Semifinish Steel: (per net ton)				
Rerolling billets	$68.50	$68.50	$68.50	$64.00
Slabs, rerolling	68.50	68.50	68.50	64.00
Forging billets	84.50	84.50	84.50	78.00
Alloy blooms, billets, slabs	96.00	96.00	96.00	86.00
Wire Rod and Skelp: (per pound)				
Wire rods	5.025¢	5.025¢	5.025¢	4.675¢
Skelp	4.225	4.225	4.225	3.90
Finished Steel Composite: (per pound)				
Base price	5.174¢	5.174¢	5.174¢	4.797¢

	Feb. 21 1956	Feb. 14 1956	Jan. 24 1956	Feb. 22 1955
Pig Iron: (per gross ton)				
Foundry, del'd Phila.	$63.69	$63.69	$63.69	$61.19
Foundry, Valley	59.00	59.00	59.00	56.50
Foundry, Southern Cin'ti	62.93	62.93	62.93	60.43
Foundry, Birmingham	55.00	55.00	55.00	52.88
Foundry, Chicago	59.00	59.00	59.00	56.50
Basic, del'd Philadelphia	62.77	62.77	62.77	60.27
Basic, Valley furnace	58.50	58.50	58.50	56.00
Malleable, Chicago	59.00	59.00	59.00	56.50
Malleable, Valley	59.00	59.00	59.00	56.50
Ferromanganese‡, cents per lb.	9.50¢	9.50¢	9.50¢	9.50¢
‡ 74.76 pct Mn base.				
Pig Iron Composite: (per gross ton)				
Pig Iron	$59.09	$59.09	$59.09	$56.59
Scrap: (per gross ton)				
No. 1 steel, Pittsburgh	$49.50	$49.50	$50.50	$38.50
No. 1 steel, Phila. area	*50.50*	51.00	52.50	39.00
No. 1 steel, Chicago	*46.00*	46.50	49.50	33.50
No. 1 bundles, Detroit	44.50	44.50	47.50	29.00
Low phos., Youngstown	*53.50*	54.50	55.50	36.50
No. 1 mach'y cast, Pittsburgh	55.50	55.50	55.50	43.50
No. 1 mach'y cast, Philadel'a.	54.50	54.50	57.50	43.50
No. 1 mach'y cast, Chicago	*50.50*	51.50	54.50	45.00
Steel Scrap Composite: (per gross ton)				
No. 1 heavy melting scrap	*$48.67*	$49.00	$50.83	$37.00
Coke, Connellsville: (per net ton at oven)				
Furnace coke, prompt	$14.25	$14.25	$14.25	$14.38
Foundry coke, prompt	16.25	16.25	16.25	16.75
Nonferrous Metals: (cents per pound to large buyers)				
Copper, electrolytic, Conn.	$46.00	$43.00	$43.00	$33.00
Copper, Lake, Conn.	43.00	43.00	43.00	33.00
Tin, Straits, New York	101.00	99.50	104.00	90.50
Zinc, East St. Louis	13.50	13.50	13.50	11.50
Lead, St. Louis	15.80	15.80	15.80	14.80
Aluminum, virgin ingot	24.40	24.40	24.40	23.20
Nickel, electrolytic	64.50	64.50	64.50	67.67
Magnesium, ingot	33.25	33.25	33.25	27.75
Antimony, Laredo, Tex.	33.00	33.00	33.00	28.50

† Tentative. ‡ Average. * Revised.

Finished Steel Composite
Weighted index based on steel bars, shapes, plates, wire, rails, black pipe, hot and cold rolled sheets and strips.

Pig Iron Composite
Based on averages for basic iron at Valley furnaces and foundry iron at Chicago, Philadelphia, Buffalo, Valley and Birmingham.

Steel Scrap Composite
Average of No. 1 heavy melting steel scrap delivered to consumers at Pittsburgh, Philadelphia and Chicago.

PIG IRON

Dollars per gross ton, f.o.b., subject to switching charges.

←To identify producers, see Key on P. 142→

Producing Point	Basic	Fdry.	Mall.	Bess.	Low Phos.
Bethlehem *B3*	60.50	61.00	61.50	62.00	.....
Birdsboro, Pa. *B6*	60.50	61.00	61.50	62.00	.....
Birmingham *R3*	54.50	55.00*	.....	.....	.....
Birmingham *W9*	54.50	55.00*	59.00	.....	.....
Birmingham *U4*	54.50	55.00*	59.00	.....	.....
Buffalo *R1*	58.50	59.00	59.50	60.00	.....
Buffalo *H1*	58.50	59.00	59.50	.....	.....
Buffalo *W6*	58.50	59.00	59.50	60.00	.....
Chester *C17*	60.50	61.00	61.50	.....	.....
Chicago *I4*	58.50	59.00	59.00	59.50	.....
Cleveland *A5*	58.50	59.00	59.00	59.50	63.50
Cleveland *R3*	58.50	59.00	59.00	59.50	.....
Duluth *I4*	58.50	59.00	59.00	59.50	.....
Erie *I4*	58.50	59.00	59.00	59.50	.....
Everett *M6*	.....	62.50	63.00	.....	.....
Fontana *K1*	64.50	65.00	.....	.....	.....
Geneva, Utah *C7*	58.50	59.00	.....	.....	.....
Granite City *G2*	60.40	60.90	61.40	.....	.....
Hubbard *Y1*	.....	.....	59.00	.....	.....
Lone Star *L3*	.....	55.00	.....	.....	.....
Midland *C11*	58.50	.....	.....	.....	.....
Minnequa *C6*	60.50	61.00	61.50	.....	.....
Monessen *P6*	58.50	.....	.....	.....	.....
Neville Is. *P4*	58.50	59.00	59.00	.....	.....
N. Tonawanda *T1*	.....	59.00	59.50	.....	.....
Pittsburgh *U1*	58.50	.....	.....	59.50	.....
Sharpsville *S3*	58.50	59.00	59.00	59.50	.....
So. Chicago *R3*	58.50	.....	59.00	.....	.....
Steelton *B3*	60.50	61.00	61.50	62.00	66.50
Swedeland *A2*	60.50	61.00	61.50	62.00	.....
Toledo *I4*	58.50	59.00	59.00	59.50	.....
Troy, N. Y. *R3*	60.50	61.00	61.50	62.00	66.50
Youngstown *Y1*	.....	.....	59.00	59.50	.....

DIFFERENTIALS: Add, 50¢ per ton for each 0.25 pct silicon or portion thereof over base (1.75 to 2.25 pct except low phos., 1.75 to 2.00 pct) 50¢ per ton for each 0.50 pct manganese or portion thereof over 1 pct, $2 per ton for 0.5 to 0.75 pct nickel, $1 for each additional, 0.25 pct nickel. * Add $1.00 for 0.31-0.69 pct phos.

Silvery Iron Buffalo, *H1*, $68.75; Jackson, *J1*, *G1*, $67.50. Add $1.25 per ton for each 0.50 pct silicon over base (6.01 to 6.50 pct) up to 17 pct. Add 75¢ for each 0.50 pct manganese over 1.0 pct. Bessemer ferrosilicon prices are $1 over comparable silvery iron.

STAINLESS STEEL

Base price cents per lb. f.o.b. mill

Product	301	302	303	304	316	321	348	410	416	430
Ingots, rerolling	17.75	19.00	—	20.25	31.50	25.00	33.75	15.00	—	15.25
Slabs, billets, rerolling	22.25	24.75	26.75	26.00	40.25	32.00	43.00	19.50	—	19.75
Forg. discs, die blocks, rings	—	—	—	—	—	—	—	—	—	—
Billets, forging	31.75	32.00	34.75	33.75	51.25	38.25	51.00	25.50	26.00	26.00
Bars, wires, structurals	38.00	38.25	41.00	40.25	60.75	45.25	60.00	30.50	31.00	31.00
Plates	40.00	40.25	42.75	43.00	64.00	49.25	64.75	31.75	32.25	32.25
Sheets	44.25	44.50	52.25	47.25	68.25	54.25	73.50	36.25	—	36.75
Strip, hot-rolled	32.00	34.50	—	37.25	58.25	44.25	50.75	—	—	—
Strip, cold-rolled	41.00	44.50	—	47.25	68.25	54.25	73.50	36.25	—	36.75

STAINLESS STEEL PRODUCING POINTS:

Sheets: Midland, Pa., *C11*; Brackenridge, Pa., *A3*; Butler, Pa., *A7*; McKeesport, Pa., *U1*; Washington, Pa., *W2*, *J2*; Baltimore, *E1*; Middletown, O., *A7*; Massillon, O., *R3*; Gary, *U1*; Bridgeville, Pa., *U2*; New Castle, Ind., *I2*; Ft. Wayne, *J4*; Philadelphia, *D5*.

Strip: Midland, Pa., *C11*; Cleveland, *A5*; Carnegie, Pa., *S9*; McKeesport, Pa., *F1*; Reading, Pa., *C2*; Washington, Pa., *W2*; W. Leechburg, Pa., *A3*; Bridgeville, Pa., *U2*; Detroit, *M2*; Canton-Massillon, O., *R3*; Middletown, O., *A7*; Harrison, N. J., *D3*; Youngstown, *C5*; Sharon, Pa., *S1*; Butler, Pa., *A7*; Wallingford, Conn., *U3* (.25¢ per lb higher); *W1* (.25¢ per lb higher); New Bedford, Mass., *R6*.

Bar: Baltimore, *A7*; Duquesne, Pa., *U1*; Munhall, Pa., *U1*; Reading, Pa., *C2*; Titusville, Pa., *U2*; Washington, Pa., *J2*; McKeesport, Pa., *U1*, *F1*; Bridgeville, Pa., *U2*; Dunkirk, N. Y., *A3*; Massillon, O., *R3*; Chicago, *U1*; Syracuse, N. Y., *C11*; Watervliet, N. Y., *A3*; Waukegan, *A5*; Canton, O., *T5*; Ft. Wayne, *I4*; Philadelphia, *D5*; Detroit, *R5*.

Wire: Waukegan, *A5*; Massillon, O., *R3*; McKeesport, Pa., *F1*; Ft. Wayne, *J4*; Harrison, N. J., *D3*; Baltimore, *A7*; Dunkirk, *A3*; Monessen, *P1*; Syracuse, *C11*; Bridgeville, *U2*.

Structurals: Baltimore, *A7*; Massillon, O., *R3*; Chicago, Ill., *J4*; Watervliet, N. Y., *A3*; Syracuse, *C11*.

Plates: Brackenridge, Pa., *A3*; Chicago, *U1*; Munhall, Pa., *U1*; Midland, Pa., *C11*; New Castle, Ind., *I2*; Middletown, *A7*; Washington, Pa., *J2*; Cleveland, Massillon, *R3*; Coatesville, Pa., *C15*; Philadelphia, *D5*.

Forged discs, die blocks, rings: Pittsburgh, *C11*; Syracuse, *C11*; Ferndale, Mich., *A3*; Washington, Pa., *J2*.

Forgings billets: Midland, Pa., *C11*; Baltimore, *A7*; Washington, Pa., *J2*; McKeesport, *F1*; Massillon, Canton, O., *R3*; Watervliet, *A3*; Pittsburgh, Chicago, *U1*; Syracuse, *C11*; Detroit, *R5*.

Market Shows Little Activity

Lack of new mill buying drops steelmaking prices in Philadelphia . . . No. 1 heavy melting off slightly in Chicago . . . Pittsburgh holds firm . . . Composite dips to $48.67.

◆ ABSENCE OF MAJOR MILL buying in the key market areas finds steelmaking grades either holding to earlier levels or off slightly from last week.

While the status quo was being maintained in Pittsburgh, a major tonnage sale was expected momentarily and feeling was that a drop in price would result.

Meanwhile, in Chicago, rumors of selling at the bottom of the price spread continue and it's generally confirmed that broker buying at $36 for No. 2 bundles and No. 2 heavy melting steel is increasingly common. On the other hand, mill efforts to buy top grades at $2 to $3 below last week's listings have so far met with little success.

In Philadelpuhia, in the face of a general lull in market activity, steelmaking grades are off slightly.

Lack of activity has depressed steelmaking and blast furnace grades by $2 a ton in New York. Brokers say prices could dip even further if new business doesn't develop soon.

And, in Cleveland, on the basis of a late sale, steelmaking prices were off $1. The drop came when a local mill entered the market and bought No. 1 heavy melting steel for $50 a ton.

On the basis of the continuing downturn in steelmaking prices in the Chicago and Philadelphia markets, THE IRON AGE scrap composite price dropped this week to $48.67.

Pittsburgh . . . Openhearth scrap grades are unchanged in the absence of any major transactions. There seems to be a good deal of discussion, but without the benefit of a sale to peg the market. A major tonnage sale is expected momentarily and reportedly, the No. 1 heavy melting price will be off. This is in line with a small tonnage sale made to a large independent last week. Blast furnace grades are unchanged.

Chicago . . . Rumors of selling at the bottom of the spread continue and it is generally confirmed that broker buying at $36 for No. 2 bundles and No. 2 heavy melting is increasingly common. On the other hand, mill attempts to buy at $2 and $3 below last week's prices have met with no great success. With heavy tonnages of scrap continuing to move at prices established early this month, broker reluctance to ship on new orders at $1-$2 less is increasingly apparent. Where shipments have moved at prices below old market prices, the new scales are counterbalanced by fresh purchases of material in equal quantities at previously established prices.

Philadelphia . . . Brokers and dealers report generally quiet market activity at the moment in the absence of any new mill buying. Steelmaking grades are reported off slightly and there is the feeling that these will be put to a further market test of strength later in the week if and when mills renew buying activity.

New York . . . Lack of mill buying has depressed prices for both steelmaking and blast furnace grades in this area. No. 1 heavy melting steel is currently quoted at $42-$48 here, and some brokers say it may dip further if new business does not develop. But others feel that when the new orders are received, prices will again be firm. The cast market continues firm with prices unchanged.

Detroit . . . Activity in the area hit a traditional standstill this week as brokers and dealers waited for the March auto lists to close. Most expect the market to be off another $1.50 when all the bids are in. A sale of foundry steel last week by a local automaker brought prices which were down as much as $4 from last month.

Cleveland . . . On the basis of a late sale, steelmaking prices in Cleveland dropped $1 a ton. A local mill came into the market and bought No. 1 heavy melting for $50. Meanwhile, some buyers for Valley mills are reportedly up in arms over a controversial $48 sale of No. 1 heavy melting in Pittsburgh which, with freight added, is under the offered Youngstown price and recent industrial and railroad scrap purchases.

Birmingham . . . Although there is no movement of openhearth scrap in this district, there is still a good demand for specialty items, with prices mostly unchanged. Electric furnace bundles declined $2 per ton for fair tonnages.

St. Louis . . . A slight falling off in shipments of scrap followed the price reductions of $1 to $3 per ton of the preceding week, but the movement is said to still be about equal to the melt. Prices are unchanged.

Cincinnati . . . A local mill moved into the market unexpectedly during the low period of the month on a fast shipment basis and was expected to buy again early next month. Price of secondary grades dropped $1 on the basis of a new buy, while a small tonnage of No. 1 heavy melting was within quoted prices at $48 delivered. Brokers are widening profit margins in the downward market trend. Dealers next month will be betting on the weather. Last week water was up to 48½ ft, and rising, thus closing barge loading docks at Louisville.

Buffalo . . . The Buffalo market is holding its own after recent price declines. No new buying has been reported on this area.

Boston . . . The market picture here remains confused. On the basis of latest activity, prices of steelmaking grades are off $1 to $1.50. Export looks a little stronger as the embargo on shipments to the docks has been lifted.

West Coast . . . Mills are getting all the scrap they need at present prices. But there's no large-scale inventory building. Mill buyers are taking it slow, keeping an eye on the export business. Exporting now is rather light.

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THE NEWEST IN A COMPLETE LINE OF ALLOY STEELS

LUKENS STEEL COMPANY, COATESVILLE, PENNSYLVANIA

Scrap Prices *(Effective Feb. 21, 1956)*

Pittsburgh

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	40.00 to 41.00
Machine shop turn	33.00 to 34.00
Mixed bor. and ms. turn	33.00 to 34.00
Shoveling turnings	36.00 to 37.00
Cast iron borings	36.00 to 37.00
Low phos. punch'gs plate	56.00 to 57.00
Heavy turnings	44.00 to 45.00
No. 1 RR. hvy. melting	54.00 to 55.00
Scrap rails, random lgth.	62.00 to 63.00
Rails 2 ft and under	67.00 to 68.00
RR. steel wheels	59.00 to 60.00
RR. spring steel	59.00 to 60.00
RR. couplers and knuckles	59.00 to 60.00
No. 1 machinery cast	55.00 to 56.00
Cupola cast	48.00 to 49.00
Heavy breakable cast	45.00 to 46.00

Chicago

No. 1 hvy. melting	$45.00 to $47.00
No. 2 hvy. melting	37.00 to 38.00
No. 1 factory bundles	50.00 to 51.00
No. 1 dealers' bundles	46.00 to 47.00
No. 2 dealers' bundles	36.00 to 37.00
Machine shop turn	25.00 to 26.00
Mixed bor. and turn	27.00 to 28.00
Shoveling turnings	27.00 to 28.00
Cast iron borings	27.00 to 28.00
Low phos. forge crops	55.00 to 56.00
Low phos. punch'gs plate	52.00 to 53.00
Low phos. 3 ft and under	51.00 to 52.00
No. 1 RR. hvy. melting	50.00 to 51.00
Scrap rails, random lgth	59.00 to 60.00
Rerolling rails	65.00 to 66.00
Rails 2 ft and under	64.00 to 65.00
Locomotive tires, cut	54.00 to 55.00
Cut bolsters & side frames	55.00 to 56.00
Angles and splice bars	62.00 to 63.00
RR. steel car axles	62.00 to 63.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	50.00 to 52.00
Cupola cast	47.00 to 48.00
Heavy breakable cast	39.00 to 40.00
Cast iron brake shoes	36.00 to 37.00
Cast iron car wheels	45.00 to 46.00
Malleable	57.00 to 58.00
Stove plate	38.00 to 39.00

Philadelphia Area

No. 1 hvy. melting	$50.00 to $51.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	50.00 to 51.00
No. 2 bundles	40.00 to 41.00
Machine shop turn	35.00 to 36.00
Mixed bor. short turn	35.50 to 36.50
Cast iron borings	35.50 to 36.50
Shoveling turnings	38.00 to 39.00
Clean cast chem. borings	41.00 to 42.00
Low phos. 5 ft and under	54.00 to 55.00
Low phos. 2 ft and under	56.00 to 57.00
Low phos. punch'gs	56.00 to 57.00
Elec. furnace bundles	53.00 to 54.00
Heavy turnings	46.00 to 47.00
RR. steel wheels	57.00 to 58.00
RR. spring steel	57.00 to 58.00
Rails 18 in. and under	65.00 to 66.00
Cupola cast	49.00 to 50.00
Heavy breakable cast	51.00 to 52.00
Cast iron car wheels	58.00 to 59.00
Malleable	66.50 to 67.50
Unstripped motor blocks	38.00 to 39.00
No. 1 machinery cast	54.00 to 55.00

Cleveland

No. 1 hvy. melting	$49.00 to $50.00
No. 2 hvy. melting	43.00 to 44.00
No. 1 bundles	49.00 to 50.00
No. 2 bundles	38.00 to 39.00
No. 1 busheling	49.00 to 50.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	33.00 to 34.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Cut struct'r'l & plates, 2 ft & under	55.00 to 56.00
Drop forge flashings	49.00 to 50.00
Low phos. punch'gs, plate	51.00 to 52.00
Foundry steel, 2 ft & under	54.00 to 55.00
No. 1 RR. heavy melting	51.00 to 52.00
Rails 2 ft and under	67.00 to 68.00
Rails 18 in. and under	68.00 to 69.00
Railroad grate bars	40.00 to 41.00
Steel axle turnings	34.00 to 35.00
Railroad cast	55.00 to 56.00
No. 1 machinery cast	54.00 to 55.00
Stove plate	51.00 to 52.00
Malleable	57.00 to 58.00

Iron and Steel Scrap

Going prices of iron and steel scrap as obtained in the trade by THE IRON AGE based on representative tonnages. All prices are per gross ton delivered to consumer unless otherwise noted.

Youngstown

No. 1 hvy. melting	$52.00 to $53.00
No. 2 hvy. melting	41.00 to 42.00
No. 1 bundles	52.00 to 53.00
No. 2 bundles	40.00 to 41.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	33.00 to 34.00
Cast iron borings	33.00 to 34.00
Low phos. plate	53.00 to 54.00

Buffalo

No. 1 hvy. melting	$45.00 to 46.00
No. 2 hvy. melting	39.00 to 40.00
No. 1 busheling	45.00 to 46.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	35.00 to 36.00
Machine shop turn.	27.00 to 28.00
Mixed bor. and turn.	28.00 to 29.00
Shoveling turnings	29.00 to 30.00
Cast iron borings	29.00 to 30.00
Low phos. plate	54.00 to 55.00
Scrap rails, random lgth.	51.00 to 52.00
Rails 2 ft and under	65.00 to 66.00
RR. steel wheels	55.00 to 56.00
RR. spring steel	55.00 to 56.00
RR. couplers and knuckles	55.00 to 56.00
No. 1 machinery cast	52.00 to 53.00
No. 1 cupola cast	48.00 to 49.00

Detroit

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$44.00 to $45.00
No. 2 hvy. melting	32.00 to 33.00
No. 1 bundles, openhearth	44.00 to 45.00
No. 2 bundles	32.00 to 33.00
New busheling	44.00 to 45.00
Drop forge flashings	43.50 to 44.50
Machine shop turn.	20.00 to 21.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	23.00 to 24.00
Cast iron borings	23.00 to 24.00
Low phos. punch'gs, plate	45.00 to 46.00
No. 1 cupola cast	44.00 to 45.00
Heavy breakable cast	37.00 to 38.00
Stove plate	38.00 to 39.00
Automotive cast	48.00 to 49.00

St. Louis

No. 1 hvy. melting	$40.50 to $41.50
No. 2 hvy. melting	37.00 to 38.00
No. 1 bundles	40.50 to 41.50
No. 2 bundles	32.00 to 33.00
Machine shop turn.	26.00 to 27.00
Cast iron borings	28.00 to 29.00
Shoveling turnings	28.00 to 29.00
No. 1 RR. hvy. melting	47.00 to 48.00
Rails, random lengths	55.00 to 56.00
Rails 18 in. and under	62.00 to 63.00
Locomotive tires uncut	53.00 to 54.00
Angles and splice bars	53.00 to 54.00
Std. steel car axles	58.00 to 59.00
RR. specialties	53.00 to 54.00
Cupola cast	47.00 to 48.00
Heavy breakable cast	37.00 to 38.00
Cast iron brake shoes	37.00 to 38.00
Stove plate	38.00 to 39.00
Cast iron car wheels	44.00 to 45.00
Rerolling rails	63.00 to 64.00
Malleable	50.00 to 51.00
Unstripped motor blocks	37.00 to 38.00

Boston

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$39.00 to $40.00
No. 2 hvy. melting	31.00 to 32.00
No. 1 bundles	39.00 to 40.00
No. 2 bundles	30.00 to 30.50
No. 1 busheling	39.00 to 40.00
Elec. furnace, 3 ft & under	42.00 to 43.00
Machine shop turn.	26.00 to 26.50
Mixed bor. and short turn.	27.00 to 28.00
Shoveling turnings	29.00 to 29.50
Clean cast chem. borings	27.00 to 28.00
No. 1 machinery cast	44.50 to 45.50
Mixed cupola cast	39.00 to 40.00
Heavy breakable cast	41.00 to 42.00
Stove plate	37.00 to 38.00
Unstripped motor blocks	24.00 to 25.00

New York

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$42.00 to $43.00
No. 2 hvy. melting	37.00 to 38.00
No. 2 bundles	30.00 to 31.00
Machine shop turn.	23.00 to 24.00
Mixed bor. and turn.	23.00 to 24.00
Shoveling turnings	26.00 to 27.00
Clean cast chem. borings	32.00 to 33.00
No. 1 machinery cast	49.00 to 50.00
Mixed yard cast	46.00 to 47.00
Charging box cast	46.00 to 47.00
Heavy breakable cast	46.00 to 47.00
Unstripped motor blocks	31.00 to 32.00

Birmingham

No. 1 hvy. melting	$41.00 to 42.00
No. 2 hvy. melting	38.00 to 39.00
No. 1 bundles	41.00 to 42.00
No. 2 bundles	29.00 to 30.00
No. 1 busheling	41.00 to 42.00
Machine shop turn.	29.00 to 30.00
Shoveling turnings	30.00 to 31.00
Cast iron borings	19.00 to 20.00
Electric furnace bundles	44.00 to 45.00
Bar crops and plate	51.00 to 52.00
Structural and plate, 2 ft	51.00 to 52.00
No. 1 RR. hvy. melting	49.00 to 50.00
Scrap rails, random lgth.	58.00 to 59.00
Rails, 18 in. and under	63.00 to 64.00
Angles & splice bars	57.00 to 58.00
Rerolling rails	62.00 to 63.00
No. 1 cupola cast	47.50 to 48.50
Stove plate	46.00 to 47.00
Charging box cast	32.00 to 33.00
Cast iron car wheels	39.00 to 40.00
Unstripped motor blocks	39.00 to 40.00
Mashed tin cans	15.00 to 16.00

Cincinnati

Brokers buying prices per gross ton, on cars:

No. 1 hvy. melting	$45.00 to $46.00
No. 2 hvy. melting	36.00 to 38.00
No. 1 bundles	45.00 to 46.00
No. 2 bundles	34.00 to 36.00
Machine shop turn.	29.00 to 30.00
Mixed bor. and turn.	30.00 to 31.00
Shoveling turnings	31.00 to 32.00
Cast iron borings	30.00 to 31.00
Low phos. 18 in. & under	53.00 to 54.00
Rails, random lengths	58.00 to 59.00
Rails, 18 in. and under	65.00 to 66.00
No. 1 cupola cast	45.00 to 46.00
Hvy. breakable cast	42.00 to 43.00
Drop broken cast	54.00 to 55.00

San Francisco

No. 1 hvy. melting	$40.00
No. 2 hvy. melting	35.00
No. 1 bundles	39.00
No. 2 bundles	32.00
No. 3 bundles	25.00
Machine shop turn.	$20.00 to 23.00
Cast iron borings	20.00
No. 1 RR. hvy. melting	40.00
No. 1 cupola cast	50.00

Los Angeles

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	36.00
No. 1 bundles	39.00
No. 2 bundles	32.00
No. 3 bundles	25.00
Machine shop turn.	18.00
Shoveling turnings	21.00
Cast iron borings	18.00
Elec. furn. 1 ft and under	42.00
No. 1 RR. hvy. melting	42.00
No. 1 cupola cast	46.00

Seattle

No. 1 hvy. melting	$42.00
No. 2 hvy. melting	38.00
No. 2 bundles	32.00
No. 3 bundles	25.00
No. 1 cupola cast	45.00
Mixed yard cast	45.00

Hamilton, Ont.

No. 1 hvy. melting	$45.50
No. 2 hvy. melting	41.50
No. 1 bundles	45.50
No. 2 bundles	38.00
Mixed steel scrap	39.50
Bushelings	35.50
Bush., new fact., prep'd	43.50
Bush., new fact., unprep'd.	39.50
Machine shop turn.	18.00
Short steel turn.	27.50
Mixed bor. and turn.	$16.00 to 19.00
Rails, rerolling	53.50
Cast scrap	42.00 to 45.00

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Copper Up Under Pressure

Anaconda raises copper price to 46¢ per lb . . . Chilean finance minister reveals Chile had requested increase . . . Other producers follow suit . . . Fabricators in favor.

◆ "SINCE COPPER is the mainstay of its economy, Chile is interested in a higher price . . . will exert as much diplomatic pressure as it can muster for a higher U. S. price . . . producer's copper will cost 46¢ per lb before 1956 is half over." (IRON AGE, January 5, p. 310.)

Late last week Anaconda Copper Corp. announced a boost in the price of its copper, 3¢ per lb to 46¢, delivered.

Simultaneously, the Chilean minister of finance declared that his government was asking the American copper companies to increase the then going price of copper by 3¢ to 5¢ per lb.

There seems to be no doubt that Chilean pressure pushed Anaconda up. In fact, whenever a higher price is initiated by Anaconda rather than another producer, it's a good idea to at least look toward Chile. Anaconda subsidiaries are the largest copper producers in Chile, taking about twice as much copper ore from the ground as Kennecott's subsidiary. Thus since Anaconda is more dependent on Chile, it is more susceptible to Chilean pressures.

Kennecott Copper Co. and Phelps Dodge went along with Anaconda and raised their prices to 46¢ per lb after a surprisingly short period of deliberation.

The increase is a normal one from the outlook of world supply-and-demand balance. The previous U. S. price had been the lowest in the world. Even 46¢ ranks among the lowest and is still about 3¢-4¢ below that of the biggest competitor for world copper, the London Metals Exchange. This higher price however might serve to lure more desperately needed foreign copper to this country.

Usually fabricators are on the other side of the fence, against any price increase. However, in this case a surprising number of them climbed the fence. With the serious work stoppages that have occurred thus far this year in both Chile and U. S., LIFO inventories, built up a bit at the end of 1955, were beginning to sag seriously. In many cases, price is of lesser importance than getting enough copper to maintain full production.

This increase reflects a sharp change in thinking from the end of 1955. At that time, a rosy future was being predicted, based on no work stoppages. E. S. Hann, Kennecott Co., had indicated in a conference that he felt the price of copper was a little high. Bache & Co., a major Wall St. investments house with a department specializing in metals, reported that it was the consensus among producers that the price was too high and that a lower price might be in the offing provided there were no crippling work stoppages.

The serious strikes predominating early this year and Chilean pressure were enough to swing the change.

The higher price will probably achieve its purpose—for awhile at least.

As soon as consumers and producers assimilate the change and begin operating under the new price, eyes will start turning toward June when the contract between the producers and the International Mine, Mill and Smelter Workers runs out. A duplication of last year's inactivity could result in another increase. Or smooth settlement could yet mean a record year and easier U. S. market conditions for copper.

TIN . . . Increased buying activity and the threat of labor trouble in Malaya strengthened the tin market this week. Initial negotiations to settle disputes between management and the Malayan Mining Employees Union broke down. The 4000 workers in the Selangor local affected have scheduled a meeting for February 26. It is reported that the entire union, 18,000 strong, is preparing for a showdown with the Employers Assn. It is likely that issues will be settled to the satisfaction of both parties.

GOVERNMENT . . . ODM will "take" 104 million lb of copper and copper base alloy products for military and atomic energy needs in the second quarter of 1956, a reduction of 12 million lb from the first quarter set-aside.

The 104 million lb total includes amounts needed for defense related ("B") products.

Percentages of mill space to be reserved include: alloyed brass mill plate, sheet, strip, and rolls, decreased from 8 to 6 pct; rod, bar shapes, and wire, decreased from 7 to 5 pct; alloyed seamless tube and pipe, decreased from 20 to 16 pct; unalloyed brass mill plate, sheet, strip, and rolls remains at 8 pct; unalloyed rod, bar, shapes, and wire remains at 9 pct; unalloyed seamless tube and pipe remains at 5 pct; copper wire and cable remains at 9 pct; copper foundry products remain at 8 pct; and reserve space for copper-base powder mill products will be distcontinued.

Daily Nonferrous Metal Prices

(Cents per lb except as noted)

	Feb. 15	Feb. 16	Feb. 17	Feb. 18	Feb. 20	Feb.21
Copper, electro, Conn.	43.00	43.00	43.00	....	46.00	46.00
Copper, Lake, delivered	43.00	43.00	43.00	....	43.00	43.00
Tin, Straits, New York	100.00	99.75	100.125	....	100.50	101.00*
Zinc, East St. Louis	13.50	13.50	13.50	13.50	13.50	13.50
Lead, St. Louis	15.80	15.80	15.80	15.80	15.80	15.80

Note: Quotations are going prices. **Tentative*

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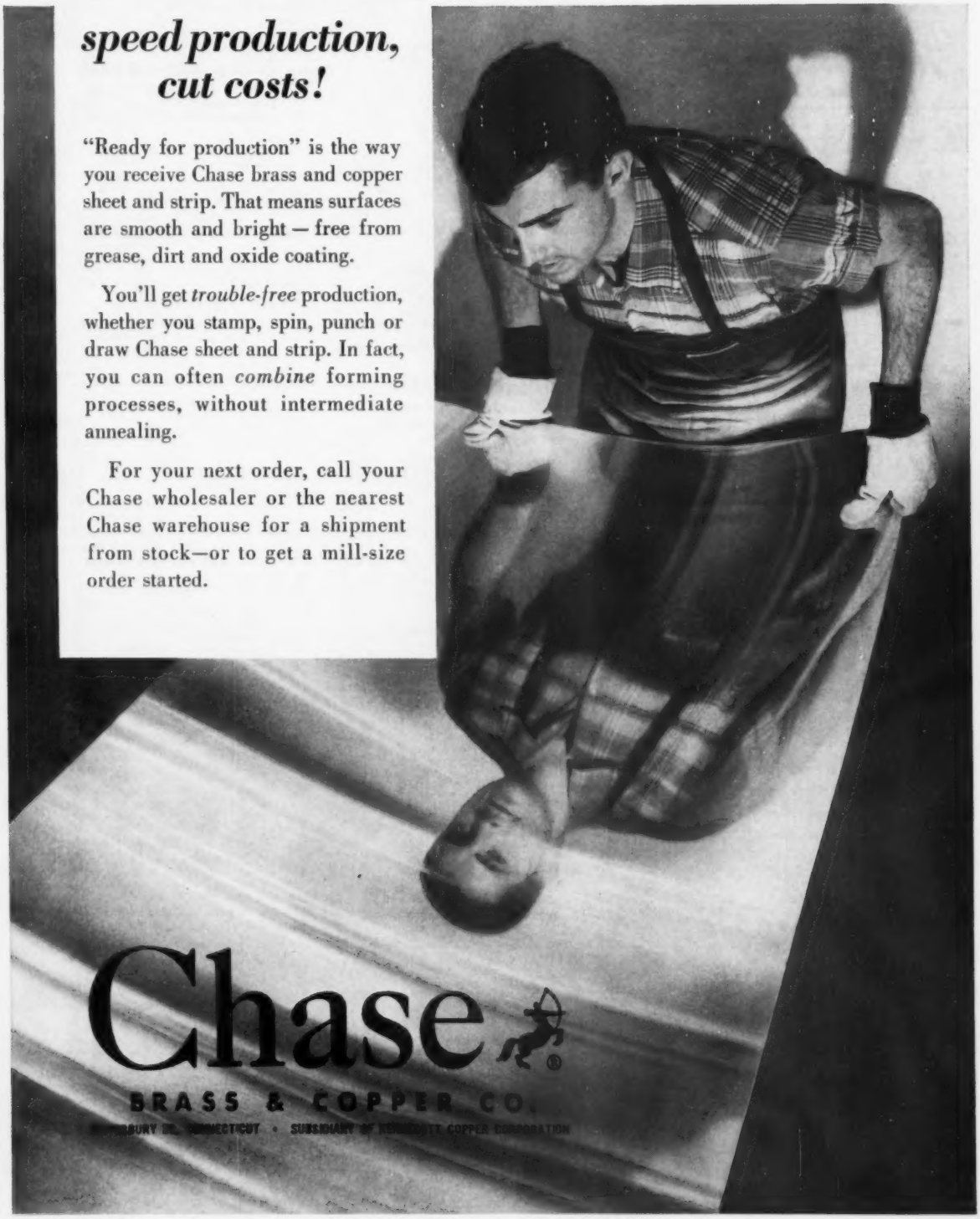
You'll get *trouble-free* production, whether you stamp, spin, punch or draw Chase sheet and strip. In fact, you can often *combine* forming processes, without intermediate annealing.

For your next order, call your Chase wholesaler or the nearest Chase warehouse for a shipment from stock—or to get a mill-size order started.



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Nonferrous Prices *(Effective Feb. 21, 1956)*

MILL PRODUCTS

(Cents per lb, unless otherwise noted)

Aluminum

(Base 30,000 lb, f.o.b. ship. pt., frt. allowed)

Flat Sheet (Mill Finish) and Plate

("F" temper except 6061-0)

Alloy	.032	.081	.136–.249	.250–3.
1100, 3003	40.8	38.7	37.5	36.5
5052	48.3	43.4	41.7	39.9
6061-0	45.4	41.2	39.4	39.3

Extruded Solid Shapes

Factor	6063 T-5	6062 T-6
6–8	41.6–43.3	56.6–60.2
12–14	42.3–43.7	57.5–61.8
24–26	45.3–45.7	67.7–72.1
36–38	53.6–54.2	90.5–94.3

Screw Machine Stock—2011-T-3

Size"	¼	⅜–⅝	⅞–1	1¼–1½
Price	54.5	53.4	52.1	50.1

Roofing Sheet, Corrugated

(Per sheet, 26" wide, base, 16,000 lb)

Length" →	72	96	120	144
.019 gage	$1.295	$1.727	$2.160	$2.590
.024 gage	1.615	2.162	2.692	3.232

Magnesium

(f.o.b. shipping pt., carload frt. allowed)

Sheet and Plate

Type ↓ Gage →	.250–.253	.250–.252	.125	.064	.032
AZ31A Stand. Grade	.....	61	63.5	78	99
AZ31A Spec.	.....	79	83	100	145
Tread Plate	64	.....	68	.....	.....
Tooling Plate	65	.....	.....	.....	.....

Extruded Shapes

	1" diam. rod	shapes lb/ft 0.3	1.0	4.0	2" OD x ⅛" W. tubing
Comm. Grade (FS)	61.50	65.4–72.4	61.9–67.3	57.7–62.2	74.5
Spec. Grade (AZ31B)	73	76.9–83.9	73.4–78.8	69.2–73.7	86

Alloy Ingot

AZ91B (Die Casting) ..... 31 (delivered)
AX63A, AZ92A, AZ91C (Sand Casting) 36 (Velasco, Tex.)

Nickel, Monel, Inconel

(Base prices, f.o.b. mill)

	"A" Nickel	Monel	Inconel
Sheet, CR	102	83	99
Strip, CR	102	92	125
Rod, Bar, HR	87	74	93
Angles, HR	87	74	93
Plate, HR	97	87	95
Seamless Tube	122	110	153
Shot, Blocks	...	71	...

Copper, Brass, Bronze

(Freight included on 500 lb)

	Sheet	Rods	Extruded Shapes
Copper	63.13	....	63.48
Copper, h-r	58.76	59.11	....
Copper, drawn	....	60.36	....
Low brass	60.15	60.09	....
Yellow brass	55.60	55.54	....
Red brass	61.79	61.73	....
Naval brass	52.83	51.41	48.40
Leaded brass	....	....	48.42
Com. bronze	63.98	63.92	....
Mang. bronze	59.39	53.38	54.94
Phos. bronze	85.37	81.50	....
Muntz metal	53.74	49.55	50.80
Ni silver 10 pct	66.00	68.33	70.68

Beryllium copper Cr, 1.9% Be, Base 2000 lb, f.o.b.
Strip $1.84
Rod, bar, wire 1.81

Titanium

(20,000 lb base, f.o.b. mill)

Sheet and strip, commercially pure, $13.10-$13.60; alloy $15.25-$15.75; Plate, HR, commercially pure, $10.50-$11.00; alloy, $11.50-$12.00. Wire, rolled and/or drawn, commercially pure, $9.50-$11.50; alloy, $11.50; Bar, HR or forged, commercially pure, $7.90-$8.15; alloy, $7.90-$8.10.

PRIMARY METAL

(Cents per lb, unless otherwise noted)

Aluminum ingot, 99+%, 10,000 lb. freight allowed 24.40
Aluminum pig 22.50
Antimony, American, Laredo, Tex. 33.50
Beryllium copper, per lb conta'd Be $43.00
Beryllium aluminum 5% Be, Dollars per lb contained Be $72.75
Bismuth, ton lots $2.25
Cadmium, del'd $1.70
Cobalt, 97-99% (per lb) ..... $2.60 to $2.67
Copper, electro, Conn. Valley 46.00
Copper, Lake, delivered 43.00
Gold, U. S. Treas., per troy oz. $35.00
Indium, 99.9%, dollars per troy oz. $2.25
Iridium, dollars per troy oz. $100 to $120
Lead, St. Louis 15.80
Lead, New York 16.00
Magnesium, 99.8+%, f.o.b. Freeport, Tex., 10,000 lb, pig 32.50
ingot 33.25
Magnesium, sticks, 100 to 500 lb. 53.00
Mercury, dollars per 76-lb flask, f.o.b. New York ..... $270 to $274
Nickel electro 64.50
Nickel oxide sinter at Copper Cliff, Ont., contained nickel 60.75
Palladium, dollars per troy oz. $23 to $24
Platinum, dollars per troy oz. $97 to $107
Silver, New York, cents per troy oz. 91.625
Tin, New York 101.00*
Titanium sponge, grade A-1 $3.15 to $3.45
Zinc, East St. Louis 13.50
Zinc, New York 14.00
Zirconium, sponge $10.00
* Tentative

REMELTED METALS

Brass Ingot

(Cents per lb delivered, carloads)

85-5-5-5 ingot
No. 115 ..... 42.00
No. 120 ..... 41.25
No. 123 ..... 40.50
80-10-10 ingot
No. 305 ..... 45.75
No. 315 ..... 44.00
88-10-2 ingot
No. 210 ..... 58.25
No. 215 ..... 54.75
No. 245 ..... 48.75
Yellow ingot
No. 405 ..... 33.25
Manganese bronze
No. 421 ..... 37.75

Aluminum Ingot

(Cents per lb del'd 30,000 lb and over)

95-5 aluminum-silicon alloys
0.30 copper max. 31.00-31.50
0.60 copper max. 30.75-31.25
Piston alloys (No. 122 type) 32.50-33.25
No. 12 alum. (No. 2 grade) 29.50-30.00
108 alloy 29.50-30.00
195 alloy 31.00-32.00
13 alloy (0.60 copper max.) 30.75-31.25
AXS-679 ..... 29.50-30.00

Steel deoxidizing aluminum, notch bar granulated or shot

Grade 1—95-97½% 29.50-30.50
Grade 2—92-95% 28.50-29.50
Grade 3—90-92% 28.00-29.00
Grade 4—85-90% 27.50-28.25

SCRAP METALS

Brass Mill Scrap

(Cents per pound, add 1¢ per lb for shipments of 20,000 lb and over)

	Heavy	Turnings
Copper	39	38¼
Yellow brass	29¼	27⅛
Red brass	34⅝	33⅝
Comm. bronze	35¾	35
Mang. bronze	27½	26¾
Yellow brass rod ends	29	....

Custom Smelters Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 43½
No. 2 copper wire 42
Light copper 39½
*Refinery brass 38½
* Dry copper content.

Ingot Makers Scrap

(Cents per pound carload lots, delivered to refinery)

No. 1 copper wire 43½
No. 2 copper wire 42
Light copper 39½
No. 1 composition 35
No. 1 comp. turnings 34½
Hvy. yellow brass solids 25
Brass pipe 28½
Radiators 27½

Aluminum

Mixed old cast ..... 19½—20½
Mixed new clips ..... 20½—21½
Mixed turnings, dry ..... 20 —21

Dealers' Scrap

(Dealers' buying price, f.o.b. New York in cents per pound)

Copper and Brass

No. 1 heavy copper and wire 40 —40½
No. 2 heavy copper and wire 38 —38½
Light copper ..... 36 —36½
New type shell cuttings .... 34½—35
Auto radiators (unsweated) 23½—24
No. 1 composition ..... 31 —31½
No. 1 composition turnings 29 —29½
Unlined red car boxes ..... 25 —25½
Cocks and faucets ..... 24½—25
Clean heavy yellow brass .... 20 —20½
Brass pipe ..... 25 —25½
New soft brass clippings .... 26 —26½
No. 1 brass rod turnings .... 23½—24

Aluminum

Alum. pistons and struts .. 17 —17½
Aluminum crankcases ..... 16¾—17¼
1100 (2S) aluminum clippings 20½
Old sheet and utensils ..... 16¾—17¼
Borings and turnings ..... 11½—12
Industrial castings ..... 16¾—17¼
2024 (24S) clippings ..... 19 —19½

Zinc

New zinc clippings ..... 8½— 9
Old zinc ..... 6 — 6½
Zinc routings 4¼
Old die cast scrap 3½

Nickel and Monel

Pure nickel clippings $1.50
Clean nickel turnings $1.25
Nickel anodes $1.50
Nickel rod ends $1.50
New Monel clippings 60
Clean Monel turnings 50
Old sheet Monel 55
Nickel silver clippings, mixed. 25
Nickel silver turnings, mixed. 21

Lead

Soft scrap lead ..... 12½—13
Battery plates (dry) ..... 6¾— 7
Batteries, acid free 4½

Miscellaneous

Block tin ..... 83 —84
No. 1 pewter ..... 66 —67
Auto babbitt ..... 43½—44½
Mixed common babbitt 15½
Solder joints ..... 20 —20½
Siphon tops 50
Small foundry type ..... 16½—16½
Monotype ..... 14¾—15¼
Lino. and stereotype ..... 14 —14½
Electrotype ..... 12¼—12¾
Hand picked type shells ..... 10½—11
Lino. and stereo. dross ..... 5¾— 6
Electro. dross ..... 4¾— 5

IRON AGE

STEEL PRICES

(Effective Feb. 21, 1956)

Italics identify producers listed in key at end of table. Base prices, f.o.b. mill, in cents per lb., unless otherwise noted. Extras apply.

		BILLETS, BLOOMS, SLABS			PILING	SHAPES STRUCTURALS			STRIP					
		Carbon Rerolling Net Ton	Carbon Forging Net Ton	Alloy Net Ton	Sheet Steel	Carbon	Hi Str. Low Alloy	Carbon Wide-Flange	Hot-rolled	Cold-rolled	Hi Str. H.R. Low Alloy	Hi Str. C.R. Low Alloy	Alloy Hot-rolled	Alloy Cold-rolled
EAST	Bethlehem, Pa.			$96.00 *B3*		4.65 *B3*	6.80 *B3*	4.65 *B3*						
	Buffalo, N. Y.	$68.50 *B3*	$84.50 *R3, B3*	$96.00 *R3, B3*	5.45 *B3*	4.65 *B3*	6.80 *B3*	4.65 *B3*	4.325 *R3,B3*	6.25 *B3* 6.25 *R7,S10*	6.425 *B3*	9.10 *B3*		
	Claymont, Del.													
	Harrison, N. J.													13.45 *C11*
	Conshohocken, Pa.								4.375 *A2*	6.30 *A2*	6.425 *A2*			
	New Bedford, Mass.									6.70 *R6*				
	Johnstown, Pa.	$68.50 *B3*	$84.50 *B3*	$96.00 *B3*		4.65 *B3*	6.80 *B3*							
	Boston, Mass.									6.80 *T8*				13.80 *T8*
	New Haven, Conn.									6.70 *D1 A5*				
	Phoenixville, Pa.					5.15 *P2*		5.15 *P2*						
	Sparrows Pt., Md.								4.325 *B3*	6.25 *B3*	6.425 *B3*	9.10 *B3*		
	Bridgeport, Wallingford, Conn.	$73.50 *N8*	$89.50 *N8*						4.625 *N8*	6.70 *W1*			7.50 *N8*	
	Pawtucket, R. I. Worcester, Mass.									6.80 *N7 A5*				*A5* 13.80 *N7*
MIDDLE WEST	Alton, Ill.								4.50 *L1*					
	Ashland, Ky.								4.325 *A7*					
	Canton-Massillon, Dover, Ohio		$86.50 *R3*	$96.00 *R3*										13.45 *G4*
	Chicago, Ill.	$68.50 *U1*	$84.50 *R3, U1,W8*	$96.00 *R3, U1,W8*	5.45 *U1*	4.60 *U1, W8*	6.75 *U1, Y1*	4.60 *U1*	4.55 *A1* 4.325 *N4,W8*	6.35 *A1,T8*			7.20 *W8*	13.45 *T8*
	Cleveland, Ohio									6.25 *A5,J3*		9.30 *A5*		13.45 *A5*
	Detroit, Mich.			$96.00 *R5*					4.425 *G3,M2*	6.35 *D1,D2, G3,M2,P11*	6.525 *G3*	9.20 *D2, G3*		
	Duluth, Minn.													
	Gary, Ind. Harbor, Indiana	$68.50 *U1*	$84.50 *U1*	$96.00 *U1, Y1*	5.45 *I3*	4.60 *U1, I3*	6.75 *U1, I3*		4.325 *I3, U1,Y1*	6.35 *I3* 6.25 *Y1*	6.425 *I3, U1,Y1*	9.30 *Y1*	7.20 *Y1, U1*	
	Sterling, Ill.								4.425 *N4*					
	Indianapolis, Ind.									6.40 *C5*				
	Newport, Ky.												7.20 *N5*	
	Middletown, Ohio									6.45 *A7*				
	Niles, Warren, Ohio Sharon, Pa.	$68.50 *C10*	$84.50 *C10*	$96.00 *C10*					4.325 *S1, R3*	6.25 *S1, R3,T4*	6.425 *S1, R3*	9.10 *S1, R3*	7.20 *S1*	13.45 *S1*
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	$68.50 *U1, J3*	$84.50 *J3, U1,C11*	$96.00 *U1, C11*	5.45 *U1*	4.60 *U1, J3*	6.75 *U1, J3*	4.60 *U1*	4.325 *P6*	6.25 *S7,B4*			7.20 *S9*	13.45 *S9*
	Portsmouth, Ohio								4.325 *P7*					
	Weirton, Wheeling, Follansbee, W. Va.					4.60 *W3*			4.325 *W3*	6.25 *F3,W3*	6.425 *W3*	9.10 *W3*		
	Youngstown, Ohio		$84.50 *C10*	$96.00 *Y1, C10*		4.60 *Y1*	6.75 *Y1*		4.325 *U1, Y1*	6.25 *Y1,C5*	6.425 *U1, Y1*	9.30 *Y1*	7.20 *U1, Y1*	13.45 *C5*
WEST	Fontana, Cal.	$76.00 *K1*	$92.00 *K1*	$115.00 *K1*		5.25 *K1*	7.40 *K1*	5.40 *K1*	5.075 *K1*	8.00 *K1*	7.525 *K1*		8.85 *K1*	
	Geneva, Utah		$84.50 *C7*			4.60 *C7*	6.75 *C7*							
	Kansas City, Mo.					4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	
	Los Angeles, Torrance, Cal.		$94.00 *B2*	$116.00 *B2*		5.30 *C7, B2*	7.45 *B2*		5.075 *C7, B2*	8.30 *C1*			8.40 *B2*	
	Minnequa, Colo.					4.90 *C6*			5.425 *C6*					
	Portland, Ore.					5.35 *O2*								
	San Francisco, Niles, Pittsburg, Cal.		$94.00 *B2*			5.25 *B2, P9*	7.40 *B2*		5.075 *B2, C7*					
	Seattle, Wash.		$98.00 *B2*			5.35 *B2*	7.50 *B2*		5.325 *B2*					
SOUTH	Atlanta, Ga.								4.525 *A8*					
	Fairfield, Ala. City, Birmingham, Ala.	$68.50 *T2*	$84.50 *T2*			5.10 *C16* 4.60 *R3,T2*	6.75 *T2*		4.325 *R3,T2* 4.825 *C16*		6.425 *T2*			
	Houston, Lone Star, Tex.	$74.50 *L3*	$89.50 *S2*	$101.00 *S2*		4.70 *S2*	6.85 *S2*				6.675 *S2*		7.45 *S2*	

STEEL PRICES

(Effective Feb. 21, 1956)

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		SHEETS									WIRE ROD	TINPLATE†		BLACK PLATE
		Hot-rolled *18* ga. & hvyr.	Cold-rolled	Galvanized *10* ga.	Enameling *12* ga.	Long Terne *10* ga.	Hi Str. Low Alloy H.R.	Hi Str. Low Alloy C.R.	Hi Str. Low Alloy Galv.	Hot-rolled *19* ga.		Cokes* *1.25*-lb. base box	Electro* *0.25*-lb. base box	Holloware Enameling *29* ga.
EAST	Bethlehem, Pa.													
	Buffalo, N. Y.	4.325 *B3*	5.325 *B3*				6.375 *B3*	7.875 *B3*			5.375 *W6*	† Special coated mfg. terne deduct 50¢ from 1.25-lb. coke base box price. Can-making quality blackplate 55 to 128 lb. deduct $2.20 from 1.25-lb. coke base box. * COKES: 1.50-lb. add 25¢. ELECTRO: 0.50-lb. add 25¢; 0.75-lb. add 65¢; 1.00-lb. add $1.00. Differential 1.00 lb./0.25 lb. add 65¢.		
	Claymont, Del.													
	Coatesville, Pa.													
	Conshohocken, Pa.	4.375 *A2*	5.375 *A2*				6.425 *A2*							
	Harrisburg, Pa.													
	Hartford, Conn.													
	Johnstown, Pa.										5.375 *B3*			
	Fairless, Pa.	4.375 *U1*	5.375 *U1*				6.425 *U1*	7.925 *U1*				$9.30 *U1*	$8.00 *U1*	
	New Haven, Conn.													
	Phoenixville, Pa.													
	Sparrows Pt., Md.	4.325 *B3*	5.325 *B3*	5.85 *B3*			6.375 *B3*	7.875 *B3*	8.60 *B3*		5.475 *B3*	$9.30 *B3*	$8.00 *B3*	
	Worcester, Mass.										5.675 *A5*			
	Trenton, N. J.													
MIDDLE WEST	Alton, Ill.										5.20 *L1*			
	Ashland, Ky.	4.325 *A7*		5.85 *A7*	5.90 *A7*									
	Canton-Massillon, Dover, Ohio			5.85 *R1, R3*										
	Chicago, Joliet, Ill.	4.55 *A1* 4.325 *W8*					6.375 *U1*				5.025 *N4* 5.375 *A5, R3*			
	Sterling, Ill.										5.375 *N4*			
	Cleveland, Ohio	4.325 *J3, R3*	5.325 *J3, R3*		5.90 *R3*		6.375 *J3, R3*	7.875 *J3, R3*			5.375 *A5*			
	Detroit, Mich.	4.425 *G3, M2*	5.425 *G3* 5.325 *M2*				6.475 *G3*	7.975 *G3*						
	Newport, Ky.	4.325 *N5*	5.325 *N5*	5.85 *N5*										
	Gary, Ind. Harbor, Indiana	4.325 *I3, U1, Y1*	5.325 *I3, U1, Y1*	5.85 *U1, I3*	5.90 *U1, I3*	6.25 *U1*	6.375 *Y1, U1, I3*	7.875 *U1, Y1*			5.025 *Y1*	$9.20 *I3, U1, Y1*	$7.90 *I3, U1, Y1*	6.65 *U1, Y1*
	Granite City, Ill.	4.525 *G2*	5.525 *G2*	6.05 *G2*	6.10 *G2*								$8.00 *G2*	6.75 *G2*
	Kokomo, Ind.			5.95 *C9*							5.475 *C9*			
	Mansfield, Ohio	4.325 *E2*	5.325 *E2*			6.25 *E2*				*E2*				
	Middletown, Ohio		5.325 *A7*	5.85 *A7*	5.90 *A7*	6.25 *A7*								
	Niles, Warren, Ohio Sharon, Pa.	4.325 *S1, R3, N3*	5.325 *R3, N3*	5.85 *R3* 6.85 *N3*	5.90 *N3*	6.25 *N3*	6.375 *S1, R3*	7.875 *R3*				$9.20 *R3*	$7.90 *R3*	
	Pittsburgh, Pa. Midland, Pa. Butler, Pa.	4.325 *J3, U1, P6*	5.325 *J3, U1, P6*	5.85 *U1*	5.90 *U1, A7*		6.375 *J3, U1*	7.875 *U1*	8.60 *U1*		5.025 *P6* 5.375 *A5*	$9.20 *J3, U1*	$7.90 *J3, U1*	6.65 *U1*
	Portsmouth, Ohio	4.325 *P7*	5.325 *P7*								5.375 *P7*			
	Weirton, Wheeling, Follansbee, W. Va.	4.325 *W3, W5*	5.325 *W3, W5, F3*	5.85 *W3, W5*		6.25 *W3, W5*	6.375 *W3*	7.875 *W3*				$9.20 *W3, W5*	$7.90 *W3, W5*	6.65 *F3, W5*
	Youngstown, Ohio	4.325 *U1, Y1*	5.325 *Y1*		5.90 *Y1*		6.375 *U1, Y1*	7.875 *Y1*			5.025 *Y1*			
WEST	Fontana, Cal.	5.075 *K1*	6.425 *K1*				7.125 *K1*	8.975 *K1*						
	Geneva, Utah	4.425 *C7*												
	Kansas City, Mo.										5.625 *S2*			
	Los Angeles, Torrance, Cal.										6.175 *B2*			
	Minnequa, Colo.										5.275 *C6*			
	San Francisco, Niles, Pittsburg, Cal.	5.025 *C7*	6.275 *C7*	6.60 *C7*							5.675 *C7*	$9.95 *C7*	$8.65 *C7*	
	Seattle, Wash.													
SOUTH	Atlanta, Ga.													
	Fairfield, Ala. Alabama City, Ala.	4.325 *R3, T2*	5.325 *T2*	5.85 *R3, T2*			6.375 *T2*			5.625 *R3*	5.025 *R3, T2*	$9.30 *T2*	$8.00 *T2*	
	Houston, Tex.										5.625 *S2*			

IRON AGE

STEEL PRICES

(Effective Feb. 21, 1956)

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		BARS						PLATES				WIRE
		Carbon Merchant	Reinforcing	Cold Finished	Alloy Hot-rolled	Alloy Cold Drawn	Hi Str. H.R. Low Alloy	Carbon Steel	Floor Plate	Alloy	Hi Str. Low Alloy	Mfr's. Bright
EAST	Bethlehem, Pa.				5.575 *B3*	7.425 *B3*	6.80 *B3*					
	Buffalo, N. Y.	4.65 *B3,R3*	4.65 *B3,R3*	6.30 *B5*	5.575 *B3,R3*	7.425 *B3,B5*	6.80 *B3*	4.50 *B3,R3*				6.60 *W6*
	Claymont, Del.							4.80 *C4*		6.30 *C4*	6.725 *C4*	
	Coatesville, Pa.							4.80 *L4*		6.30 *L4*	6.725 *L4*	
	Conshohocken, Pa.							4.50 *A2*	5.575 *A2*		6.725 *A2*	
	Harrisburg, Pa.							5.10 *P2*	5.575 *C3*			
	Hartford, Conn.			6.40 *R3*		7.725 *R3*						
	Johnstown, Pa.	4.65 *B3*	4.65 *B3*		5.575 *B3*		6.80 *B3*	4.50 *B3*		6.30 *B3*	6.725 *B3*	6.60 *B3*
	Fairless, Pa.	4.80 *U1*	4.80 *U1*		5.725 *U1*							
	Newark, N. J.			6.70 *W10*		7.60 *W10*						
	Camden, N. J.			6.70 *P10*								
	Bridgeport, Putnam, Conn.	4.80 *N8*		6.80 *W10*	5.725 *N8*			4.750 *N8*				
	Sparrows Pt., Md.		4.65 *B3*					4.50 *B3*		6.30 *B3*	6.725 *B3*	6.70 *B3*
	Palmer, Worcester, Readville, Mass. Milton, Pa.	4.80 *M7*	4.80 *M7*	6.70 *W11* 6.45 *C14* 6.70 *B5*		7.725 *A5,B5*		4.50 *R3*				6.90 *A5* 6.90 *W6*
	Spring City, Pa.			6.35 *K4*		7.60 *K4*						
MIDDLE WEST	Alton, Ill.	4.85 *L1*										6.425 *L1*
	Ashland, Newport, Ky.							4.50 *A7,N5*		6.30 *N5*		
	Canton-Massillon, Mansfield, Ohio	4.75 *R3*		6.25 *R2,R3*	5.575 *R3,T5*	7.425 *R2,R3, T5*		4.50 *E1*				
	Chicago, Joliet, Ill.	4.65 *U1, N4,W8,R3, P13*	4.65 *N4,R3, P13*	6.25 *B5,W8, W10,A5,L2*	5.575 *U1,R3, W8*	7.425 *A5,W8, W10,L2,B5*		4.50 *U1,W8, I3,R3* 4.275 *A1*	5.575 *U1*	6.30 *U1*	6.725 *U1*	6.60 *A5,R3, N4,W7*
	Cleveland, Ohio	4.65 *R3*	4.65 *R3*	6.25 *A5,C13*		7.425 *A5,C13*	6.80 *R3*	4.60 *J3,R3*	5.575 *J3*		6.725 *R3,J3*	6.60 *A5, C13*
	Detroit, Mich.	4.75 *G3*	4.75 *G3*	5.90 *R5* 6.45 *B5* 6.15 *P3* 6.10 *P8*	5.575 *R5* 5.675 *G3*	7.425 *R5* 7.625 *B5,P3, P8*	6.90 *G3*	4.60 *G3*			6.825 *G3*	
	Duluth, Minn.											6.60 *A5*
	Gary, Ind. Harbor, Crawfordsville	4.65 *I3, U1, Y1*	4.65 *I3, U1, Y1*	6.25 *M5,R3*	5.575 *I3, U1, Y1*	7.425 *M5, R3*	6.80 *U1,I3, Y1*	4.50 *I3, U1,Y1*	5.575 *I3*	6.30 *U1,Y1*	6.725 *U1, I3,Y1*	6.35 *M4*
	Granite City, Ill.							4.70 *G2*				
	Kokomo, Ind.											6.70 *C9*
	Sterling, Ill.	4.75 *N4*	4.75 *N4*									6.60 *N4*
	Niles, Warren, Ohio Sharon, Pa.	4.65 *R3,C10*		6.25 *C10*	5.575 *C10*	7.425 *C10*	6.80 *R3*	4.50 *S1,R3*		6.30 *S1*	6.725 *S1*	
	Pittsburgh, Pa. Midland, Pa.	4.65 *J3, U1, C11*	4.65 *J3, U1*	6.25 *A5,C8, C11,J3, W10,B4,R3*	5.575 *U1,C11*	7.425 *A5,C11, W10,C8,R3*	6.80 *J3, U1*	4.50 *J3, U1*	5.575 *U1*	6.30 *U1*	6.725 *J3, U1*	6.60 *A5,J3, P5*
	Portsmouth, Ohio											6.60 *P7*
	Weirton, Wheeling, Follansbee, W. Va.	4.65 *W3*						4.50 *W3,W5*				
	Youngstown, Ohio	4.65 *U1,Y1, C10,R3*	4.65 *U1,Y1, R3*	6.25 *Y1, U1*	5.575 *U1,Y1, C10*	7.425 *Y1,C10, F2*	6.80 *U1,Y1*	4.50 *U1,Y1, R3*		6.30 *Y1*	6.725 *Y1*	6.25 *Y1*
WEST	Emeryville, Cal.	5.40 *J5*	5.40 *J5*									
	Fontana, Cal.	5.35 *K1*	5.35 *K1*		6.625 *K1*		7.50 *K1*	5.15 *K1*		6.95 *K1*	7.375 *K1*	
	Geneva, Utah							4.50 *C7*			6.725 *C7*	
	Kansas City, Mo.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*					6.85 *S2*
	Los Angeles, Torrance, Cal.	5.35 *B2,C7*	5.35 *B2,C7*	7.35 *R3*	6.625 *B2*		7.50 *B2*				7.625 *B2*	7.55 *B2*
	Minnequa, Colo.	5.10 *C6*	5.10 *C6*					5.35 *C6*				6.50 *C6*
	Portland, Ore.	5.40 *O2*	5.40 *O2*									
	San Francisco, Niles, Pittsburg, Cal.	5.35 *C7* 5.40 *B2,P9*	5.35 *C7* 5.40 *B2,P9*				7.55 *B2*					7.20 *C7*
	Seattle, Wash.	5.40 *B2,P12, N6*	5.40 *B2,P12*				7.55 *B2*	5.40 *B2*		7.20 *B2*	7.625 *B2*	
SOUTH	Atlanta, Ga.	4.85 *A8*	4.85 *A8*									6.45 *A8*
	Fairfield, Ala. City, Birmingham, Ala.	4.65 *T2,R3* 5.15 *C16*	4.65 *T2,R3* 5.15 *C16*				6.80 *T2*	4.50 *T2,R3*			6.725 *T2*	6.60 *R3, T2*
	Houston, Ft. Worth, Lone Star, Tex.	4.90 *S2*	4.90 *S2*		5.825 *S2*		7.05 *S2*	4.85 *L3* 4.60 *S2*		6.40 *S2*	6.825 *S2*	6.85 *S2*

Steel Prices *(Effective Feb. 21, 1956)*

Key to Steel Producers

With Principal Offices

A1 Acme Steel Co., Chicago
A2 Alan Wood Steel Co., Conshohocken, Pa.
A3 Allegheny Ludlum Steel Corp., Pittsburgh
A4 American Cladmetals Co., Carnegie, Pa.
A5 American Steel & Wire Div., Cleveland
A6 Angell Nail & Chaplet Co., Cleveland
A7 Armco Steel Corp., Middletown, O.
A8 Atlantic Steel Co., Atlanta, Ga.

B1 Babcock & Wilcox Tube Div., Beaver Falls, Pa.
B2 Bethlehem Pacific Coast Steel Corp., San Francisco
B3 Bethlehem Steel Co., Bethlehem, Pa.
B4 Blair Strip Steel Co., New Castle, Pa.
B5 Bliss & Laughlin, Inc., Harvey, Ill.
B6 Brook Plant, Wickwire Spencer Steel Div., Birdsboro, Pa.

C1 Calstrip Steel Corp., Los Angeles
C2 Carpenter Steel Co., Reading, Pa.
C3 Central Iron & Steel Co., Harrisburg, Pa.
C4 Claymont Products Dept., Claymont, Del.
C5 Cold Metal Products Co., Youngstown, O.
C6 Colorado Fuel & Iron Corp., Denver
C7 Columbia Geneva Steel Div., San Francisco
C8 Columbia Steel & Shafting Co., Pittsburgh
C9 Continental Steel Corp., Kokomo, Ind.
C10 Copperweld Steel Co., Pittsburgh, Pa.
C11 Crucible Steel Co. of America, Pittsburgh
C12 Cumberland Steel Co., Cumberland, Md.
C13 Cuyahoga Steel & Wire Co., Cleveland
C14 Compressed Steel Shafting Co., Readville, Mass.
C15 G. O. Carlson, Inc., Thorndale, Pa.
C16 Connors Steel Div., Birmingham
C17 Chester Blast Furnace, Inc., Chester, Pa.

D1 Detroit Steel Corp., Detroit
D2 Detroit Tube & Steel Div., Detroit
D3 Driver Harris Co., Harrison, N. J.
D4 Dickson Weatherproof Nail Co., Evanston, Ill.
D5 Henry Disston & Sons, Inc., Philadelphia

E1 Eastern Stainless Steel Corp., Baltimore
E2 Empire Steel Co., Mansfield, O.

F1 Firth Sterling, Inc., McKeesport, Pa.
F2 Fitzsimmons Steel Corp., Youngstown
F3 Follansbee Steel Corp., Follansbee, W. Va.

G1 Globe Iron Co., Jackson, O.
G2 Granite City Steel Co., Granite City, Ill.
G3 Great Lakes Steel Corp., Detroit.
G4 Greer Steel Co., Dover, O.

H1 Hanna Furnace Corp., Detroit

I2 Ingersoll Steel Div., Chicago
I3 Inland Steel Co., Chicago
I4 Interlake Iron Corp., Cleveland

J1 Jackson Iron & Steel Co., Jackson, O.
J2 Jessop Steel Corp., Washington, Pa.
J3 Jones & Laughlin Steel Corp., Pittsburgh
J4 Joslyn Mfg. & Supply Co., Chicago
J5 Judson Steel Corp., Emeryville, Calif.

K1 Kaiser Steel Corp., Fontana, Cal.
K2 Keystone Steel & Wire Co., Peoria
K3 Koppers Co., Granite City, Ill.
K4 Keystone Drawn Steel Co., Spring City, Pa.

L1 Laclede Steel Co., St. Louis
L2 La Salle Steel Co., Chicago
L3 Lone Star Steel Co., Dallas
L4 Lukens Steel Co., Coatesville, Pa.

M1 Mahoning Valley Steel Co., Niles, O.
M2 McLouth Steel Corp., Detroit
M3 Mercer Tube & Mfg. Co., Sharon, Pa.
M4 Mid-States Steel & Wire Co., Crawfordsville, Ind.
M5 Monarch Steel Div., Hammond, Ind.
M6 Mystic Iron Works, Everett, Mass.
M7 Milton Steel Products Div., Milton, Pa.

N1 National Supply Co., Pittsburgh
N2 National Tube Div., Pittsburgh
N3 Niles Rolling Mill Div., Niles, O.
N4 Northwestern Steel & Wire Co., Sterling, Ill.
N5 Newport Steel Corp., Newport, Ky.
N6 Northwest Steel Rolling Mills, Seattle
N7 Newman Crosby Steel Co., Pawtucket, R. I.
N8 Northeastern Steel Corp., Bridgeport, Conn.

O1 Oliver Iron & Steel Co., Pittsburgh
O2 Oregon Steel Mills, Portland

P1 Page Steel & Wire Div., Monessen, Pa.
P2 Phoenix Iron & Steel Co., Phoenixville, Pa.
P3 Pilgrim Drawn Steel Div., Plymouth, Mich.
P4 Pittsburgh Coke & Chemical Co., Pittsburgh
P5 Pittsburgh Screw & Bolt Co., Pittsburgh
P6 Pittsburgh Steel Co., Pittsburgh
P7 Portsmouth Div., Detroit Steel Corp., Detroit
P8 Plymouth Steel Co., Detroit
P9 Pacific States Steel Co., Niles, Cal.
P10 Precision Drawn Steel Co., Camden, N. J.
P11 Production Steel Strip Corp., Detroit
P12 Pacific Steel Rolling Mills, Seattle
P13 Phoenix Mfg. Co., Joliet, Ill.

R1 Reeves Steel & Mfg. Co., Dover, O.
R2 Reliance Div., Eaton Mfg. Co., Massillon, O.
R3 Republic Steel Corp., Cleveland
R4 Roebling Sons Co., John A., Trenton, N. J.
R5 Rotary Electric Steel Co., Detroit
R6 Rodney Metals, Inc., New Bedford, Mass.
R7 Rome Strip Steel Co., Rome, N. Y.

S1 Sharon Steel Corp., Sharon, Pa.
S2 Sheffield Steel Corp., Kansas City
S3 Shenango Furnace Co., Pittsburgh
S4 Simonds Saw and Steel Co., Fitchburg, Mass.
S5 Sweet's Steel Co., Williamsport, Pa.
S6 Standard Forging Corp., Chicago
S7 Stanley Works, New Britain, Conn.
S8 Superior Drawn Steel Co., Monaca, Pa.
S9 Superior Steel Corp., Carnegie, Pa.
S10 Seneca Steel Service, Buffalo

T1 Tonawanda Iron Div., N. Tonawanda, N. Y.
T2 Tennessee Coal & Iron Div., Fairfield
T3 Tennessee Products & Chem. Corp., Nashville
T4 Thomas Strip Div., Warren, O.
T5 Timken Steel & Tube Div., Canton, O.
T6 Tremont Nail Co., Wareham, Mass.
T7 Texas Steel Co., Forth Worth
T8 Thompson Wire Co., Boston

U1 United States Steel Corp., Pittsburgh
U2 Universal-Cyclops Steel Corp., Bridgeville, Pa.
U3 Ulbrich Stainless Steels, Wallingford, Conn.
U4 U. S. Pipe & Foundry Co., Birmingham

W1 Wallingford Steel Co., Wallingford, Conn.
W2 Washington Steel Corp., Washington, Pa.
W3 Weirton Steel Co., Weirton, W. Va.
W4 Wheatland Tube Co., Wheatland, Pa.
W5 Wheeling Steel Corp., Wheeling, W. Va.
W6 Wickwire Spencer Steel Div., Buffalo
W7 Wilson Steel & Wire Co., Chicago
W8 Wisconsin Steel Co., S. Chicago, Ill.
W9 Woodward Iron Co., Woodward, Ala.
W10 Wyckoff Steel Co., Pittsburgh
W11 Worcester Pressed Steel Co., Worcester, Mass.
W12 Wallace Barnes Steel Div., Bristol, Conn.

Y1 Youngstown Sheet & Tube Co., Youngstown, O.

PIPE AND TUBING

Base discounts (pct) f.o.b. mills. Base price about $200 per net ton.

	BUTTWELD														SEAMLESS							
	½ In.		¾ In.		1 In.		1¼ In.		1½ In.		2 In.		2½-3 In.		2 In.		2½ In.		3 In.		3½-4 In.	
STANDARD T. & C.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.	Blk.	Gal.
Sparrows Pt. *B3*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Youngstown *R3*	18.50	1.25	21.50	5.25	24.00	8.75	26.50	10.00	27.00	11.00	27.50	11.50	29.00	11.75								
Fontana *K1*	7.00	+2.25	10.00	+8.25	12.50	+4.75	15.00	+3.00	15.50	+2.00	16.00	+1.50	17.50	+0.75								
Pittsburgh *J3*	18.50	1.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Alton, Ill. *L1*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Sharon *M3*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Fairless *N2*	16.50	1.25	19.50	5.25	22.00	8.75	24.50	9.50	25.00	10.50	25.50	11.00	27.00	10.75								
Pittsburgh *N1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Wheeling *W5*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Wheatland *W4*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75								
Youngstown *Y1*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
Indiana Harbor *Y1*	17.50	2.25	20.50	6.25	23.00	9.75	25.50	10.00	26.00	11.50	26.50	12.00	28.00	11.75								
Lorain *N2*	18.50	3.25	21.50	7.25	24.00	10.75	26.50	11.50	27.00	12.50	27.50	13.00	29.00	12.75	6.50	+8.50	10.50	+6.25	13.00	+3.75	14.50	+2.25
EXTRA STRONG PLAIN ENDS																						
Sparrows Pt. *B3*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Youngstown *R3*	23.00	7.25	27.00	11.25	29.00	14.75	29.50	14.00	30.00	15.00	30.50	15.50	31.00	14.75								
Fairless *N2*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Fontana *K1*	11.50		15.50		17.50		18.00		18.50		19.00		19.50									
Pittsburgh *J3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Alton, Ill. *L1*	21.00	7.25	25.00	11.25	27.00	14.75	27.50	13.50	28.00	14.50	28.50	15.00	29.00	13.75								
Sharon *M3*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Pittsburgh *N1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Wheeling *W5*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Wheatland *W4*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75								
Youngstown *Y1*	23.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75
Indiana Harbor *Y1*	22.00	8.25	26.00	12.25	28.00	15.75	28.50	14.50	29.00	15.50	29.50	16.00	30.00	14.75								
Lorain *N2*	21.00	9.25	27.00	13.25	29.00	16.75	29.50	15.50	30.00	16.50	30.50	17.00	31.00	15.75	8.00	+6.00	13.00	+2.75	15.50	+0.25	20.50	4.75

Threads only, buttweld and seamless 2¼ pt higher discount. Plain ends, buttweld and seamless, 3-in. and under, 5½ pt higher discount.

Galvanized discounts based on zinc price range of over 9¢ to 11¢ per lb. East St. Louis. For each 2¢ change in zinc, discounts vary as follows: ½, ¾ and 1-in., 2 pt.; 1¼, 1½ and 2 in., 1½ pt.; 2½ and 3-in., 1 pt., e.g., zinc price range of over 11¢ to 13¢ would lower discounts; zinc price in range over 7¢ to 9¢ would increase discounts. East St. Louis zinc price now 13.50¢ per lb.

TOOL STEEL

F.o.b. mill

W	Cr	V	Mo	Co	per lb
18	4	1	—	—	$1.60
18	4	1	—	5	2.305
18	4	2	—	—	1.765
1.5	4	1.5	8	—	.96
6	4	3	6	—	1.35
6	4	2	5	—	1.105

High-carbon chromium ..... .77
Oil hardened manganese ..... .43
Special carbon ..... .39
Extra carbon ..... .33
Regular carbon ..... .275

Warehouse prices on and east of Mississippi are 4¢ per lb higher. West of Mississippi, 6¢ higher.

CLAD STEEL

Base prices, cents per lb f.o.b.

	Cladding	Plate (*A3, J2, L4*) 10 pct	Plate (*A3, J2, L4*) 15 pct	Plate (*A3, J2, L4*) 20 pct	Sheet (*I2*) 20 pct
Stainless Type	304	30.30	33.15	36.05	32.50
	316	35.50	38.45	41.40	47.00
	321	32.00	34.85	37.75	37.25
	347	34.40	37.90	41.40	48.25
	405	25.80	29.60	33.35	.....
	410, 430	25.30	29.10	32.85	.....

CR Strip (S9) Copper, 10 pct, 2 sides, 33.00; 1 side, 30.00.

ELECTRICAL SHEETS

22-Gage F.o.b. Mill Cents Per Lb	Hot-Rolled (Cut Lengths)*	Cold-Reduced (Coiled or Cut Length) Semi-Processed	Cold-Reduced (Coiled or Cut Length) Fully Processed
Field	8.40	8.60	.....
Armature	9.35	9.60	10.10
Elect.	9.95	10.20	10.70
Motor	10.95	11.20	11.70
Dynamo	11.85	12.10	12.60
Trans. 72	12.80	13.05	13.55
Trans. 65	13.35	Grain Oriented	
Trans. 58	13.85	Trans. 80	17.45
Trans. 52	14.85	Trans. 73	17.95

Producing points: Beech Bottom (*W5*); Brackenridge (*A3*); Granite City (*G2*); Indiana Harbor (*I3*); Mansfield (*E2*); Newport, Ky. (*N5*); Niles, O. (*N3*); Vandergrift (*U1*); Warren, O. (*R3*); Zanesville (*A7*).

* Coils 75¢ higher.

LAKE SUPERIOR ORES

51.50% *Fe natural content, delivered lower Lake ports. Prices for 1956 season. Freight changes for seller's account.*

	Gross Ton
Openhearth lump	$12.10
Old range, bessemer	11.25
Old range, nonbessemer	11.10
Mesabi, bessemer	11.00
Mesabi, nonbessemer	10.85
High phosphorus	10.85

WAREHOUSES

Metropolitan Price, dollars per 100 lb.

Cities	** City Delivery Charge	Sheets: Hot-Rolled	Sheets: Cold-Rolled	Sheets: Galvanized (10 gage)	Strip: Hot-Rolled	Strip: Cold-Rolled	Plates	Shapes: Standard Structural	Bars: Hot-Rolled	Bars: Cold-Finished	Alloy Bars: Hot-Rolled 4615 As rolled	Alloy Bars: Hot-Rolled 4140 Annealed	Alloy Bars: Cold-Drawn 4615 As rolled	Alloy Bars: Cold-Drawn 4140 Annealed
Baltimore	$.10	7.31	8.32	8.37	7.65	.....	7.63	7.93	7.61	8.62	14.38	13.44–13.96	16.36	16.29–16.49
Birmingham	.15	6.80	7.93	8.85	7.06	.....	6.99	7.28	7.08	9.35	.....	.....	.....	.....
Boston	.10	7.85	8.91	10.37	8.06	.....	7.99	8.23	7.97	9.77	.....	13.60	.....	16.70
Buffalo	.15	7.35	8.40	10.16	7.50	.....	7.80	7.75	7.50	8.25	.....	13.45	.....	16.50
Chicago	.15	7.28	8.29	9.25	7.36	.....	7.60	7.58	7.42	7.90	.....	13.20	.....	16.30
Cincinnati	.15	7.24	8.23	9.10	7.45	.....	7.74	7.90	7.51	8.15	13.59	13.29	16.44	16.39
Cleveland	.15	7.28	8.24	8.95	7.31	.....	7.77	7.76	7.33	8.00	13.41	13.11	16.26	16.21
Denver		8.60	10.76	11.22	8.90	.....	8.60	8.75	8.90	9.82	.....	.....	.....	17.97
Detroit	.15	7.47	8.43	9.53	7.49	.....	7.88	7.90	7.55	.....	13.70	13.40	16.55	16.50
Houston		7.85	8.75	10.49	8.15	.....	7.80	8.20	8.25	9.85–9.95	14.35	14.00	17.15	17.05
Kansas City	.20	7.47	8.76	9.17	7.73	.....	7.66	7.95	7.75	8.52	13.87	13.52	16.72	16.57
Los Angeles	.10	8.60	10.10	11.10	8.45	.....	8.85	8.40	8.25	11.00	.....	14.45	.....	18.00
Memphis	.10	7.12	8.25	.....	7.38	.....	7.31	7.60	7.40	9.15	.....	.....	.....	.....
Milwaukee	.15	7.37	8.48	9.34	7.45	.....	7.69	7.75	7.51	8.09	.....	13.29	.....	16.39
New Orleans	.15	7.20	8.35	.....	7.45	.....	7.40	7.70	7.50	9.55	.....	.....	.....	.....
New York	.10	7.71	8.94	9.69	8.27	.....	7.96	8.19	8.21	9.68	.....	13.53	.....	16.63
Norfolk	.20	7.25	.....	.....	7.65	.....	7.45	7.95	7.65	9.50	.....	.....	.....	.....
Philadelphia	.10	7.42	8.52	9.47	8.03	.....	7.78	7.84	7.78	8.56	.....	13.31	.....	16.41
Pittsburgh	.15	7.28	8.24	9.40	7.31	9.00	7.60	7.43	7.27	8.00	13.35	13.05	16.20	16.15
Portland		7.80–8.60	8.80–10.15	10.65	8.00	7.95	7.75	7.85–8.15	7.95	12.20	.....	15.00	.....	17.50
Salt Lake City	.20	.....	10.60	.....	9.35	.....	.....	9.20	9.15	.....	.....	.....	.....	.....
San Francisco	.10	8.20	9.75	10.25	8.45	.....	8.15	8.35	8.25	11.55	.....	14.45	.....	18.00
Seattle	.60	8.55	10.40	10.80	8.65	.....	8.20	8.30	8.40	.....	.....	14.65	.....	.....
St. Louis	.15	7.57	8.68	9.84	7.65	.....	7.89	7.98	7.71	8.44	.....	13.49	.....	16.59
St. Paul	.25	7.94	8.59–9.14	9.89	7.72	.....	7.65	7.94	7.74	8.51	.....	13.51	.....	16.31

Base Quantities (Standard unless otherwise keyed): Cold finished bars: 2000 lb or over. Alloy bars: 1000 to 1999 lb. All others: 2000 to 9999 lb. All HR products may be combined for quantity. All galvanized sheets may be combined for quantity. CR sheets may not be combined with each other or with galvanized sheets for quantity.

Exceptions: (1) 1500 to 9999 lb. (2) 1000 lb or over. (3) $.25 delivery. (4) 1000 to 1999 lb, $.25 delivery.

•Plus analysis charge. ‡Deduct for country delivery.

MERCHANT WIRE PRODUCTS

F.o.b. Mill	Standard & Coated Nails Col	Woven Wire Fence 9-15½ ga. Col	"T" Fence Posts Col	Single Loop Bale Ties Col	Galv. Barbed and Twisted Barbless Wire Col	Merch. Wire Ann'ld ¢/lb.	Merch. Wire Galv. ¢/lb.
Alabama City *R3*	152	162	173	175	7.40	7.80	
Aliquippa, Pa. *J3*	152	162			7.40	7.80	
Atlanta *A8*	154	167	175	180	7.50	8.025	
Bartenville *K2**	154	168	175	181	7.50	8.075	
Buffalo *W6*					7.40	7.80	
Chicago, Ill. *N4***	152	166	173	179	7.40	8.00	
Cleveland *A6*	157				7.40	.....	
Cleveland *A5*					7.40	.....	
Crawfordsville *M4**	154	167	175	175	7.50	8.05	
Donora, Pa. *A5*	152	162	173	175	7.40	7.80	
Duluth *A5*	152	162	173	175	7.40	7.80	
Fairfield, Ala. *T2*	152	162	173	175	7.40	7.80	
Galveston *D4*	157						
Houston *S2*	157	170		180	7.65	8.05	
Johnstown, Pa. *B3**	152	166		175	7.40	7.80	
Joliet, Ill. *A5*	152	162	173	175	7.40	7.80	
Kokomo, Ind. *C9*	154	154	175	177	7.50	7.90	
Los Angeles *B2**					8.35	8.925	
Kansas City *S2*	157	167	178	180	7.65	8.05	
Minnequa *C6*	157	167	162 178	180	7.65	8.05	
Monessen *P6*	152	162			7.40	7.80	
Moline, Ill. *R3*		162	162				
Pittsburg, Cal. *C7*	171	185		195	8.35	8.75	
Portsmouth *P7*					7.40		
Rankin, Pa. *A5*	152	162		175	7.40	7.80	
So. Chicago *R3*	152	162	157 173	175	7.40	7.80	
S. San Francisco *C6*			197	195	8.35	8.75	
Sparrows Pt. *B3**	154		175	181	7.50	8.075	
Struthers, O. *Y1*					7.40	7.90	
Worcester *A5*	158				7.70	.....	
Williamsport, Pa. *S5*			160				

Galvanized products computed with zinc at 5¢ per lb Exceptions: *zinc at 12.5¢ per lb; **13¢ zinc.

C-R SPRING STEEL

Cents Per Lb F.o.b. Mill	CARBON CONTENT 0.26–0.40	0.41–0.60	0.61–0.80	0.81–1.05	1.06–1.35
Bristol, Conn. *W12*			10.80	12.95	15.65
Buffalo, N. Y. *R7*	7.00	8.95	10.50	12.65	15.35
Carnegie, Pa. *S9*		9.05	10.60	12.75	15.35
Cleveland *A5*	7.10	9.05	10.60	12.75	15.45
Detroit *D1*	7.20	9.15	10.70	12.85	.....
Detroit *D2*	7.20	9.15	10.70		
Harrison, N. J. *C11*			10.90	13.05	15.75
Indianapolis *C5*	7.15	9.10	10.50	12.65	15.35
New Castle, Pa. *B4*	7.00	8.95	10.50	12.65	.....
New Haven, Conn. *D1*	7.55	9.35	10.90	13.05	.....
Pawtucket, R. I. *N7*	7.65	9.35	10.90	13.05	15.75
Pittsburgh *S7*	7.10	9.05	10.60	12.75	15.45
Riverdale, Ill. *A1*	7.20	9.05	10.60	12.75	15.45
Sharon, Pa. *S1*	7.10	9.05	10.60	12.75	15.45
Tranton *R4*					
Wallingford *W1*	7.45	9.25	10.80	12.95	15.65
Warren, Ohio *T4*	7.00	8.95	10.50	12.65	15.35
Weirton, W. Va. *W3*	7.10	8.95	10.50		
Worcester, Mass. *A5*	7.65	9.35	10.90	13.05	15.75
Youngstown *C5*	7.00	8.95	10.50	12.65	15.35

BOILER TUBES

$ per 100 ft. carload lots, cut 10 to 24 ft. F.o.b. Mill	Size OD-In.	Size B.W. Ga.	Seamless H.R.	Seamless C.D.	Elec. Weld H.R.	Elec. Weld C.D.
Babcock & Wilcox	2	13	30.87	36.51	29.93	.....
	2½	12	41.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
National Tube	2	13	30.87	36.51	29.93	.....
	2½	12	42.57	49.16	40.31	.....
	3	12	47.99	56.76	46.55	.....
	3½	11	56.03	66.27	54.34	.....
	4	10	74.41	88.00	72.17	.....
Pittsburgh Steel	2	13	30.87	36.51	.....	.....
	2½	12	41.57	49.16	.....	.....
	3	12	47.99	56.76	.....	.....
	3½	11	56.03	66.27	.....	.....
	4	10	74.41	88.00	.....	.....

(Effective Feb. 21, 1956)

RAILS, TRACK SUPPLIES

F.o.b. Mill Cents Per Lb	No. 1 Std. Rails	Light Rails	Joint Bars	Track Spikes	Screw Spikes	Tie Plates	Track Bolts Untreated
Bessemer *U1*	4.725	5.65	5.825				
So. Chicago *R3*				7.90			
Ensley *T2*	4.725	5.65					
Fairfield *T2*		5.65		7.90		5.625	
Gary *U1*	4.725	5.65				5.625	
Ind. Harbor *I3*	4.725		5.825	7.90		5.625	
Ind. Harbor *Y1*				7.90			
Johnstown *B3*		5.65					
Joliet *U1*		5.65	5.825				
Kansas City *S2*				7.90			
Lackawanna *B3*	4.725	5.65	5.825			5.625	
Lebanon *B3*							12.15
Minnequa *C6*	4.725	6.15	5.825	7.90		5.625	12.15
Pittsburgh *O1*					11.90		12.15
Pittsburgh *P3*							12.15
Pittsburgh *J3*				7.90			
Seattle *B2*				8.40		5.775	12.65
Steelton *B3*	4.725		5.825			5.625	
Struthers *Y1*				7.90			
Torrance *C7*						5.775	
Williamsport *S5*		5.65					
Youngstown *R3*				7.90			

COKE

Furnace, beehive (f.o.b. oven) Net-Ton
Connellsville, Pa. ..... $14.00 to $14.50
Foundry, beehive (f.o.b. oven)
Connellsville, Pa. ..... $16.00 to $16.50
Foundry, oven coke
Buffalo, del'd $28.08
Chicago, f.o.b. 25.75
Detroit, f.o.b. 27.50
New England, del'd 28.55
Seaboard, N. J., f.o.b. 26.75
Philadelphia, f.o.b. 26.50
Swedeland, Pa., f.o.b. 26.50
Painesville, Ohio, f.o.b. 25.50
Erie, Pa., f.o.b. 25.00
Cleveland, del'd 27.43
Cincinnati, del'd 26.56
St. Paul, f.o.b. 23.75
St. Louis, f.o.b. 26.00
Birmingham, f.o.b. 25.65
Lone Star, Tex., f.o.b. 19.50

ELECTRODES

Cents per lb, f.o.b. plant, threaded, with nipples, unboxed.

GRAPHITE			CARBON*		
Diam. (In.)	Length (In.)	Price	Diam. (In.)	Length (In.)	Price
24	84	23.00	40	100, 110	9.90
20	72	22.25	35	110	9.90
16 to 18	72	22.50	30	110	10.05
14	72	23.00	24	72 to 84	10.30
12	72	23.50	20	90	10.10
10	60	24.25	17	72	10.35
7	60	24.50	14	72	10.85
5	60	27.25	12	60	11.75
4	40	30.25	10	60	11.80
3	40	32.00	8	60	12.10
2½	30	33.75			
2	24	52.50			

* Prices shown cover carbon nipples.

ELECTROPLATING SUPPLIES

Anodes

(Cents per lb, frt allowed in quantity)

Copper
Cast elliptical, 18 in. or longer, 5000 lb lots 58.92
Electrodeposited 55.25
Brass, 80-20, ball anodes, 2000 lb or more 58.00
Zinc, ball anodes, 2000 lb lots.... 20.75
(for elliptical add 2¢ per lb)
Nickel, 99 pct plus, rolled carbon.. 90.50
(rolled depolarized add 3¢ per lb)
Cadmium $1.70
Tin, ball anodes and elliptical. $1.06 to $1.10

Chemicals

(Cents per lb, f.o.b. shipping point)

Copper cyanide, 100 lb drum 83.50
Copper sulphate, 5 or more 100 lb bags, per cwt 18.15
Nickel salts, single, 4-100 lb bags.. 33.25
Nickel chloride, freight allowed, 300 lbs 43.50
Sodium cyanide, domestic, fob N. Y. 1 to 4 200 lb drums 21.55
(Philadelphia add .50 per lb)
Zinc cyanide, 100 to 900 lb 55.55
Potassium cyanide, 100 lb drum N. Y. 48.00
Chromic acid, flake type, 1 to 20 100 lb drums 31.20

BOLTS, NUTS, RIVETS, SCREWS

(Base discount, f.o.b. mill)

Machine and Carriage Bolt

	Discounts Full case Quantity	Full case 20,000 lb. or more
½ in. & smaller x 6 in. & shorter	61	63
Larger than ½ in. diam. and all diam. longer than 6 in.	55	57
Rolled thread carriage bolts ½ in. & smaller x 6 in. and shorter	61	63
Lag, all diam. x 6 in. & shorter	61	63
Lag, all diam. longer than 6 in.	55	57
Plow bolts	61	63

Nuts, Hex., H.P., reg. & hvy.

¾" or smaller	64	66
⅞" to 1⅛" inclusive	63	65
1¼" to 1½" inclusive	65	67
1⅝" and larger	61	63

C.P. Hex regular & hvy.

¾" or smaller	64	66
⅞" and larger	61	63

Hot Galv. Nuts (all types)

1½" or smaller 44 47

Finished, Semi-finished, Hex. Nuts

¾" and smaller	66	66
⅞" and larger	63	63

Add 25% for less than case or keg quantity.

Rivets

Base per 100 lb
½ in. and larger $9.95
Pct Off List
7/16 in. and smaller 32

Cap Screws

	Discount Bright Treated	*H.C. Heat*
New std. hex head, packaged ¼" thru ½" diam. x 6" and shorter	34	20
9/16" and ⅝" x 6" and smaller and shorter ..	31	16
¾", ⅞", 1" x 6" and shorter	9	+11
New std. hex head, bulk* ¼" thru ½" diam. x 6" and shorter	49	41
9/16" and ⅝" diam. x 6" and shorter	43	39
¾", ⅞", 1" x 6" and shorter	31	20

*Minimum quantity per item:
15,000 pieces ¼", 5/16", ⅜" diam.
5,000 pieces 7/16", ½", 9/16", ⅝" diam.
2,000 pieces ¾", ⅞", 1" diam.

Machine Screws & Stove Bolts

	Quantity	*Discount* Mach. Screws	Stove Bolts
Packaged, package list ...		27	38
Bulk, bulk list			
¼-in. diam. & under	25,000-200,000	20	61
5/16-in. diam. & larger	15,000-100,000	20	61
All diam. over 3 in. long	5,000-100,000	—	61

Machine Screw & Stove Bolt Nuts

	Quantity	*Discount* Hex	Square
Packaged, package list ...		24	27
Bulk, bulk list			
⅜-in. diam. & smaller	25,000-200,000	18	20

CAST IRON WATER PIPE INDEX

Birmingham	109.3
New York	121.5
Chicago	122.9
San Francisco-L. A.	131.1

Dec. 1955 value, Class B or heavier 6 in. or larger, bell and spigot pipe. Explanation: p. 57, Sept. 1 issue. Source: U. S. Pipe and Foundry Co.

REFRACTORIES

Fire Clay Brick

Carloads per 1000

First quality, Ill., Ky., Md., Mo., Ohio, Pa., (except Salina, Pa., add $5.00) $122.00
No. 1 Ohio ....
Sec. quality, Pa., Md., Ky., Mo., Ill. 114.00
No. 2 Ohio 98.00
Ground fire clay, net ton, bulk (except Salina, Pa., add $1.50). 18.00

Silica Brick

Mt. Union, Pa., Ensley, Ala. $128.00
Childs, Hays, Pa. 138.00
Chicago District 138.00
Western Utah 144.00
California 151.00
Super Duty
Hays, Pa., Athens, Tex., Windham, Warren, O. 145.00
Curtner, Calif. 163.00
Silica cement, net ton, bulk, Eastern (except Hays, Pa.) 21.00
Silica cement, net ton, bulk, Hays, Pa. 24.00
Silica cement, net ton, bulk, Chicago District, Ensley, Ala. 22.00
Silica cement, net ton, bulk, Utah and Calif. 32.00

Chrome Brick

Per net ton

Standard chemically bonded, Balt. $91.00
Standards chemically bonded, Curtner, Calif. 101.25
Burned, Balt. 85.00

Magesite Brick

Standard Baltimore $114.00
Chemically bonded, Baltimore 102.00

Grain Magnesite

St. ¾-in. grains

Domestic, f.o.b. Baltimore in bulk fines removed $64.00
Domestic, f.o.b. Chewalah, Wash., Luning, Nev.
in bulk 40.00
in sacks 46.00

Dead Burned Dolomite

Per net ton

F.o.b. bulk, producing points in:
Pa., W. Va., Ohio $15.00
Midwest 15.60
Missouri Valley 14.00

METAL POWDERS

Per pound, f.o.b. shipping point, in ton lots, for minus 100 mesh.

Swedish sponge iron c.l.f. New York, ocean bags ... 9.50¢
Canadian sponge iron, Del'd in East, carloads ... 9.5¢
Domestic sponge iron, 98+% Fe, carload lots ..... 9.5¢
Electrolytic iron, annealed, imported 99.5+% Fe ..... 27.5¢
domestic 99.5+% Fe ..... 36.5¢
Electrolytic iron, unannealed minus 325 mesh, 99+% Fe 57.0¢
Electrolytic iron melting stock, 99.84% pure ..... 22.0¢
Carbonyl iron size 5 to 10 micron, 98%, 00.8+% Fe.. 86.0¢ to $1.55
Aluminum freight allowed ... 34.50¢
Brass, 10 ton lots ..... 37.50¢ to 50.00¢
Copper, electrolytic ..... 61.50¢
Copper, reduced ..... 61.50¢
Cadmium, 100-199 lb. 95¢ plus metal value
Chromium, electrolytic 99.85% min. Fe .03 max. Del'd... $5.00
Lead .....7.50¢ plus metal value
Manganese ..... 70.0¢
Molybdenum, 99% .....$3.00 to $3.25
Nickel, unannealed $1.00
Nickel, annealed $1.06
Nickel, spherical, unannealed, ±80 ..... $1.18
Silicon ..... 43.50¢
Solder powder 7.0¢ to 9.0¢ plus met. value
Stainless steel, 302 ..... 99.0¢
Stainless steel, 316 ..... $1.32
Tin .....14.00¢ plus metal value
Tungsten, 99% (65 mesh) .. $4.50
Zinc, 10 ton lots .....18.75¢ to 32.50¢

ENTHONE *Leads* in SPECIALTY FINISHING PRODUCTS

METAL STRIPPERS

"ALUMON" for Plating on Aluminum

RUST REMOVERS

RUST PROOFING COMPOUNDS

ENAMEL STRIPPERS

METAL BLACKENING COMPOUNDS

Metal Cleaning and Degreasing Compounds

Conversion Coatings for Zinc and Cadmium

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. . . ALSO IN
Canada, Brazil, England, France, Sweden and Germany

Since 1930, ENTHONE Incorporated has developed and brought to the metal finishing market many specialty products and processes. Often these products have provided the answers to finishing problems previously unsolved. ENTHONE ENSTRIPS, for example, are patented products for the selective dissolving of one metal plated on another without attacking the base metal.

ENSTRIP A — U.S. Patent No. 2,649,361 — was the first product ever offered for dissolving nickel plate without attack on the steel basis metal.

ENSTRIP 165-S — U.S. Patent No. 2,698,781 — was the first product ever offered for dissolving nickel from copper base alloys without attack on the basis metal. And there are many other selective strippers in the ENSTRIPS group to meet all requirements.

If you have a metal finishing problem, ask ENTHONE *first!* Write now for the folder "They are HERE . . ." describing **20** ENTHONE answers to difficult finishing problems.

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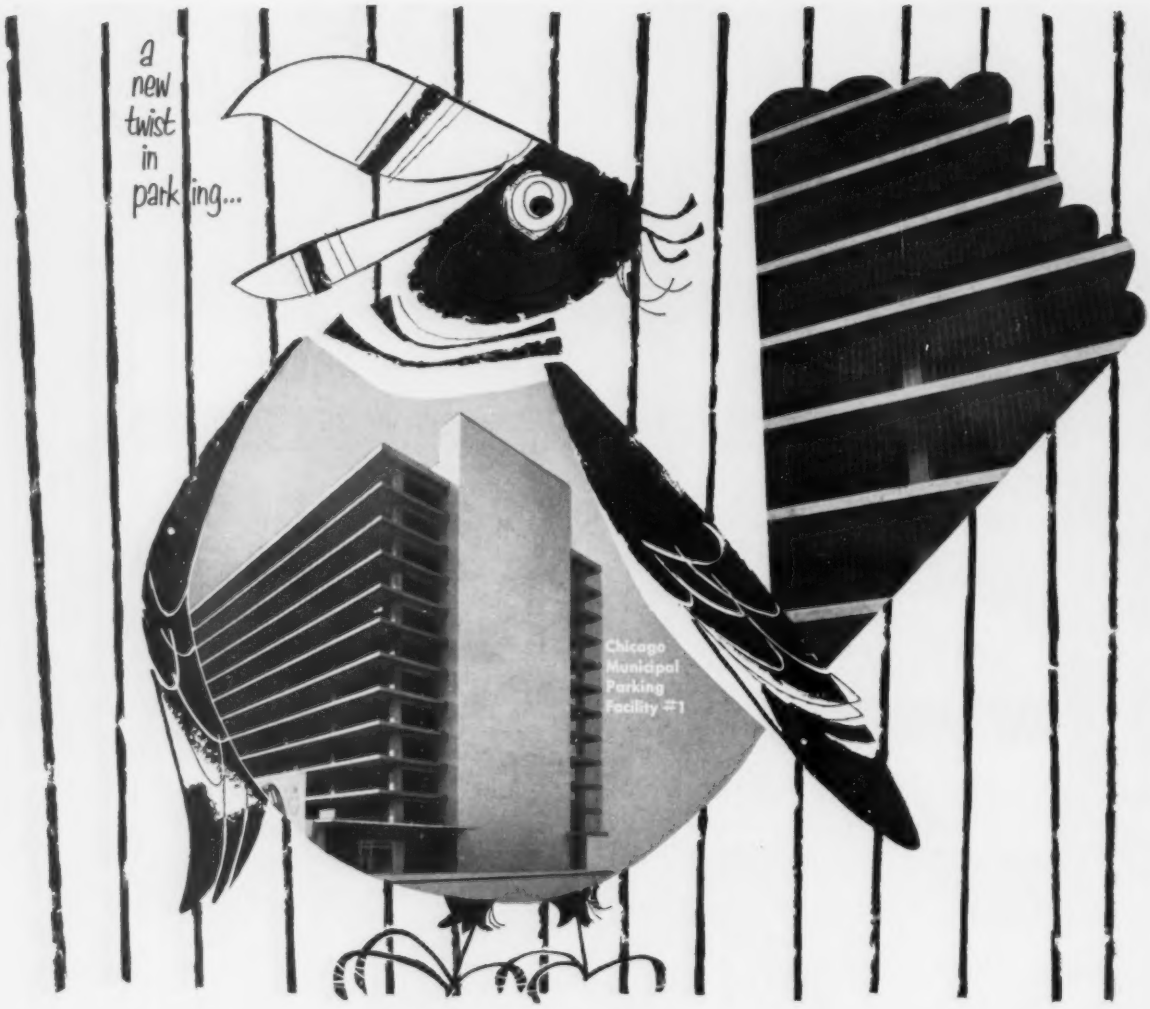

12 STORY "BIRD CAGE" SEALED IN SAFETY WITH **STAINLESS STEEL STRAND!**

Want more proof of stainless steel's versatility? Here it is: this time as a protective cable barrier in the "Bird Cage" garage – Chicago's new twist in solving parking problems.

The ⅜ in. stainless steel strand is strong enough to withstand the impact of a car traveling 40 mph! The cable assembly does away with old methods of masonry and solid wall construction, too. And what a difference that makes in construction costs!

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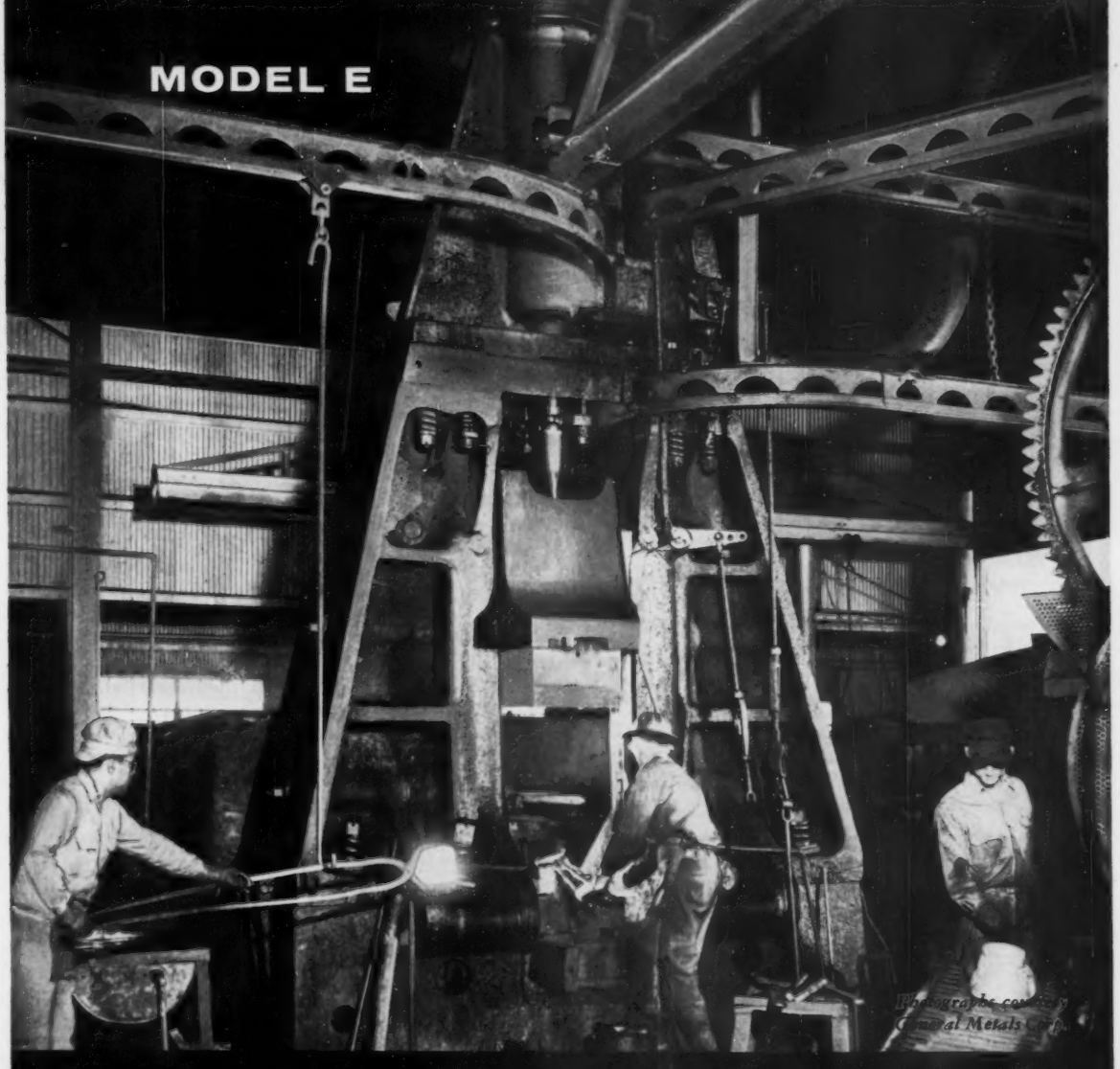
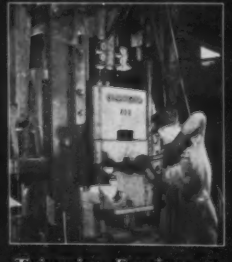
MODEL E



MODERN FORGING REQUIREMENTS DEMAND MODERN HAMMERS ·

Shown above is a 6000 lb. Model "E" Chambersburg Steam Drop Hammer forging 4" alloy steel valve bodies. A Chambersburg 200 ton Steel Side Trimming Press is used to complete the operation. The Chambersburg Model "E" Hammer pays its way through increased production and trouble-free service. Details of this modern hammer are in our Bulletin No. 55-L-4. If interested, write for a copy.



Trimming Forgings on Chambersburg Trimmer

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"ANYTHING containing IRON or STEEL"

THE CLEARING HOUSE

News of Used and Rebuilt Machinery

Chicago Buying Pace Strong . . . Current rate of machine tool buying by customers in all categories, including small job shops right up to the heavy industrial giants, is extremely strong.

Smaller shops report sales averages at least 15 pct over the year ago period, with no letup in the holiday period and the rate of inquiries still rising.

The Chicago market situation is strongly pegged on a heavy industrial expansion in the area scheduled for this year. It's expected that the Metropolitan area will hit a new high in industrial building.

However, the heavy demand coming in for used tools from small job shops indicates that, even without the high industrial expansion rate of 1955, and that expected for 1956, there is a heavy demand for equipment to meet the demands of day-to-day business.

Used tool men are beginning to feel that this combination argues for a high level of activity through the remainder of the year.

Out-of-Area Inquiries Heavy . . . Dealers' optimism is boosted further by an extremely heavy out-of-area demand for used tools from both coasts. And, intermediate points between Chicago and the West Coast are buying at an unprecedented rate at present.

Small used tool dealers who have never done business in areas like Denver have been shipping heavily into Western districts recently, many of them for the first time in their selling history.

Demand Squeezes Supply . . . The pressure is, as usual, putting a bind on the available supply of tools and the reported slowdown in Detroit doesn't seem to be producing much equipment to fill demand from other areas.

Just about any cutting tool, lathes, millers, shapers, drill presses, planers, and shears are being sought, both by dealers for resale and customers who want fast deliveries.

Automatic screw machines are enjoying heavy business, along with just about any type of equipment used in working flat-rolled steel mill products.

Roller-levelers, press brakes, presses, and shears, for instance, are advancing in price, but certainly at no faster pace than rising demand.

Business Bounce Defies Experts . . . On the basis of a three year sales curve study made by a major machine tool firm in the area, all the above is happening in a period when used tools should be hitting their slow season slump.

Normal peaks, the experts point out, occur in April, May, and June. This is followed by a heavy summer slump in July.

The slow period carries through —though at a slightly higher rate —into August. A second half peak, it's noted, doesn't usually bounce back until October.

Following the fall pickup, sales then should normally decline through November and continue at a fairly low average level through February, though the sales curve rises slightly in January.

Buys Armor Plant . . . American Auto Parts Co., Kansas City, Mo., is the new owner of a World War II armor plate plant at Gary, Ind., formerly owned by the government.

General Services Administration sold the plant for $3.26 million, including a cash down payment of $1 million.

American Auto Parts will remove obsolete machinery from the facility and use it for industrial warehousing, employing about 100 persons.

Carnegie-Illinois Div. of U. S. Steel Corp. formerly operated the plant, built in 1942 for the War Dept. It has not been used since the end of World War II.

CONSIDER GOOD USED EQUIPMENT FIRST

ANGLE BENDING ROLLS
1¾"x1⅜"x⅛" Niagara No. 3
4½"x4½"x⅜" Amplex PRR Horizontal

BALERS
#123P-66 Logemann, Charging Box 66x18x24. Produces Bale 125 to 150 lbs.
Logemann Baler, Charging Box 72x12x18". Produces 300 lb. Bale.

BENDING ROLLS
8' x ⅜" Hilles & Jones Pyramid Type
12' x ¾" Cleveland Pyramid Type
16' x ¼" Bertsch Initial Type Bending Roll
24' x ½" Hilles & Jones Pyramid Type

BRAKES—LEAF TYPE
12' x ⅜" Dreis & Krump
12' x ½" Dreis & Krump, Motor Driven

BRAKES—PRESS TYPE
14' x ⅛" Cincinnati Series 120-14

BROACH
Model VP-4-40-40 American Vertical Hydr. Broach. Max. Capacity 80 ton. Stroke 40", Motor Drive

BULLDOZER
#27 Williams & White, 22" Stroke, 16" x 80" Face of Crosshead

CRANES—OVERHEAD ELECTRIC TRAVELING

5 ton P&H	29' Span 230 Volt D.C.
5 ton Cleveland	86' Span 220 Volt D.C.
7½ ton P&H	65' Span 440/3/60 A.C.
10 ton P&H	58' Span 230 Volt D.C.
10 ton Milwaukee	80' Span 230 Volt D.C.
10 ton P&H	96' Span 220 Volt D.C.
15 ton Northern	48' Span 220/3/60 A.C.
15 ton P&H	56' Span 230 Volt D.C.
20 ton P&H	60' Span 230 Volt D.C.
20 ton Toledo	75' Span 550/3/60 A.C.
30 ton Alliance	50' Span 230 Volt D.C.
120 ton Whiting	80' Span 220/3/60 A.C.

FLANGING MACHINE
1" McCabe Pneumatic Flanging Machine

FORGING MACHINES
1" to 5" Acme, Ajax, National

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Hevi-Duty Electric Furnace, Hot Zone 18" high, 26" Wide Opening, 10'9" Deep I.D.
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1	800	Whse.		250	450/550
1	600	Al. Ch.		250	400/800
1	500	Whse.	CC-216	600	300/900
3	450	Whse.		550	415
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1	250	G.E.	MPC	230	400/600
1	200	G.E.	CD-1656Z	230	500/1500
1	200	Whse.	CB-5113	250	400/800
1	150	G.E.		600	250/750
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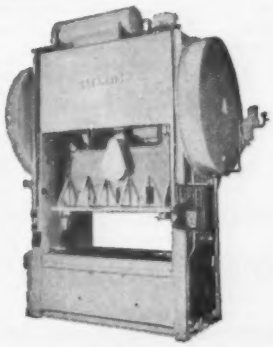

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ADVERTISERS IN THIS ISSUE

An asterisk (*) beside the name of advertiser indicates that a booklet, or other information, is offered in the advertisement. Write to the manufacturers for your copies today.

A

Air Products, Inc. 154
American Chemical Paint Co. Between Pages 32, 33
American Hoist & Derrick Co.... 111
American Society of Tool Engineers 125
American Steel & Wire Div., United States Steel Corp..... 43
American Welding & Mfg. Co., The 70
Armel, James P. 150
*Armstrong Bros. Tool Co..... 155

B

Babcock & Wilcox Co., The, Tubular Products Div. 115
*Baker Industrial Truck Div. of The Baker-Raulang Co. 10
Barron Machinery Corp. 152
*Bay State Abrasive Products Co. 14, 15, 112
*Bellows Co., The 17
Belyea Co., Inc. 149
Bennett Machinery Co. 149
Bethlehem Steel Co. 1
Brad Foote Gear Works 104
Bridgeport Brass Co. 76
Browning, Victor R., & Co., Inc... 156
Bullard Co., The 65

C

Carpenter Steel Co., The Between Pages 16, 17
*Chambersburg Engineering Co... 147
Chase Brass & Copper Co..... 137
*Chisholm-Moore Hoist Div., Columbus McKinnon Chain Corp. 113
*Cincinnati Grinders, Inc. 68
*Cincinnati Shaper Co., The....26, 27
Clark Controller Co. 40
*Clark Equipment Co., Industrial Truck Div. 127
Colorado Fuel & Iron Corp., The, Wickwire Spencer Steel Div.... 16
Columbia-Geneva Steel Div., United States Steel Corp..... 43
*Consolidated Vacuum Corp..... 114
Construction & Power Machinery, Inc. 153
Continental Screw Co. 45
Copper & Brass Research Association 60
Crawford, F. H., & Co., Inc..... 150
Crucible Steel Co. of America.. 37
Curtis Manufacturing Co., Pneumatic Division 158

D

Davidson Pipe Co., Inc..... 152
Donohue Steel Products Co., Inc. 150-153
Dony, D. E., Machinery Co..... 149
Downingtown Iron Works, Inc.... 154
Dykem Company, The 155

E

Eastern Machine Screw Corp., The 156
Eastern Machinery Co., The..... 151
Easton Car & Construction Co... 12
Electric Controller & Mfg. Co., The 72
Elstein, M. 153
Enterprise Galvanizing Co. 156
*Enthone, Incorporated 145
Espen-Lucas Machine Works, The 15

F

Fabrikant Steel Products, Inc..... 151
Falk Machinery Co. 151
*Federal Products Corp. 108
Foster, Frank B., Inc..... 150
Frank, M. K. 152

G

Garrett, Geo. K., Co., Inc..... 9
Goodman Electric Machinery Co. 149
Goss & DeLeeuw Machine Co..... 156
Gray, G. A., Company..... 121
Greenpoint Iron & Pipe Co., Inc. 152
Griffin Manufacturing Co. 155

H

*Harshaw Chemical Co., The Between Pages 16, 17
Harvey Aluminum Div., Harvey Machine Co., Inc..... 66
Hendrick Manufacturing Co. ... 80
Henault Phillip & Co. 151
Henry, A. T., & Company, Inc... 149
Hofmann, A. Jay, Co..... 153
Hoskins Manufacturing Co. Inside Front Cover
Hughes, Arnold, Co. 153
Hughes Tool Co. 150
Hydraulic Press Mfg. Co., The.... 63
Hyman, Joseph, & Sons..... 151

I

Ingersoll Steel Division, Borg-Warner Corp. 126
Inland Steel Co. 44
Iron & Steel Products, Inc..... 148

J

Jessop Steel Company Between Pages 32, 33
Job Lot Trading Co. 150

K

Kaiser Aluminum & Chemical Sales, Inc. 31, 32
Kaiser Metal Products, Inc..... 151
Kaiser Steel Corp. 154
Kasle Steel Corp. 152
Kinderman, Lou F. 151
*Kling Bros. Engineering Works.. 74
Koppers Co., Inc., Engineering & Construction Div., Freyn Department.....Between Pages 16, 17

(Continued on Page 156)

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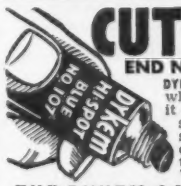

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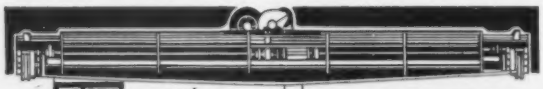
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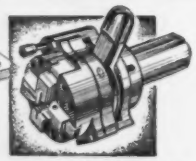
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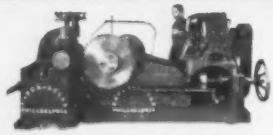
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ADVERTISERS IN THIS ISSUE

(Continued from Page 155)

L

Laclede Steel Co. 117
Lamson & Sessions Co., The..... 4
Land, L. J., Inc..... 152
Lang Machinery Co. 152
*LeBlond, R. K., Machine Tool Co., The 24, 25
*Leeds & Northrup Co. Between Pages 16, 17
*Lees-Bradner Co., The 41
Lindberg Engineering Co. Between Pages 16, 17
*Link-Belt Co. 39
Lowe Bros. 86
*Lukens Steel Co. 38, 133
*Lukenweld Division of Lukens Steel Co. 38
Luria Bros. & Co., Inc..... 135
Luria Steel and Trading Corp.... 152

M

McLouth Steel Corp. Between Pages 32, 33
MacCabe, T. B., Co. 149
Magic Chef, Inc. 153
*Magnaflux Corporation 123
*Manning, Maxwell & Moore, Inc. 82
Merit Service Co. 153
Martin, Joe, Co., Inc., The..... 153
Miles Machinery Co. 149
Minster Machine Co., The..... 83
*Monarch Machine Tool Co.....28, 29
Morrison Railway Supply Co..... 152
*Mueller Brass Company 18, 19

N

National Business Bourse, Inc.... 154
National Machinery Exchange... 152
National Steel Corp. 33
National Tube Div., United States Steel Corp. 43
*Nelson Stud Welding Div. of Gregory Industries, Inc. 118
New Britain Machine Co., The Between Pages 16, 17
Norton Company 78
Norton Co., Machine Div.....22, 23

O

O'Brien, Clarence J. 150
Osborn Mfg. Co., The..... 5

P

*Pangborn Corp...Inside Back Cover
Peninsular Grinding Wheel Division, Abrasive & Metal Products Co. 81
Platt Bros. & Co., The..... 156
Purdy Company, The 152

R

Rail & Industrial Equip. Co., Inc. 152
*Republic Steel Corp. 20, 21
Revere Copper & Brass, Inc. Between Pages 16, 17
Roebling's, John A., Sons Corp. Between Pages 32, 33
*Rotary Electric Steel Co. Between Pages 32, 33
Ryerson, Jos. T., & Son, Inc..... 6

S

SKF Industries, Inc. 36
Sharon Steel Corp. 8
Simonds Gear & Manufacturing Co., The 11
Smith, A. O., Corporation, Welding Products Division ...84, 85
Solvay Metal Sales, Ltd. 151
Sonken-Galamba Corp. 151
Springfield Machine Tool Company, The 107
*Standard Conveyor Co. 116
Standard Pressed Steel Co. Between Pages 32, 33
Steel & Tube Div., The Timken Roller Bearing Co. ...Back Cover
Stemm Bros., Inc..... 153
Stevens, Frederic B., Inc..... 106
*Superior Tube Co. 128

T

Tennessee Coal & Iron Div., United States Steel Corp..... 43
*Thomas Flexible Coupling Co... 124
Timken Roller Bearing Co., The Back Cover
*Towmotor Corp. 34

U

Udylite Corp., The 119
United Engineering & Foundry Co. Between Pages 32, 33
United States Steel Corp..... 43
United States Steel Export Co... 43
United States Steel Supply Div., United States Steel Corp..... 43

V

Vanadium Corp. of America..... 146
*Vulcan Crucible Steel Co., Division H. K. Porter Company, Inc. 13

W

Wallack Bros. 153
Ward Steel Co. 112
*Watson-Stillman Press Division, Farrel-Birmingham Company, Inc. 105
Weirton Steel Co. 33
Weiss, B. M., Co..... 151
Weiss Steel Co., Inc..... 153
Wickwire Spencer Steel Div., The, Colorado Fuel & Iron Corp.... 16
Williams-White & Co. 157
Wilson, Lee, Engineering Co., Inc. 59
Wysong & Miles Co. 30

Y

*Yoder Co., The 42
Youngstown Foundry & Machine Co. 103
Youngstown Welding & Engineering Co. 35

CLASSIFIED SECTION

Business Opportunities 153
Clearing House 148-153
Contract Manufacturing Appears in first and third issue of each month. See Feb. 2 & Feb. 16
Employment Exchange 154
Equipment & Materials Wanted.. 153

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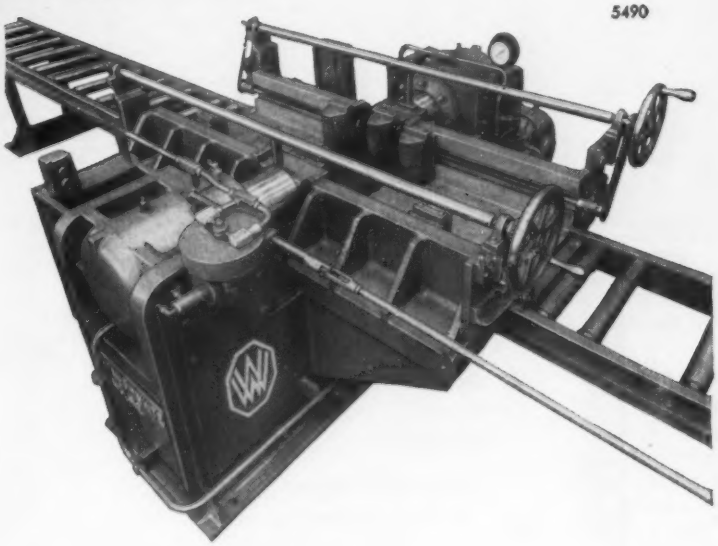

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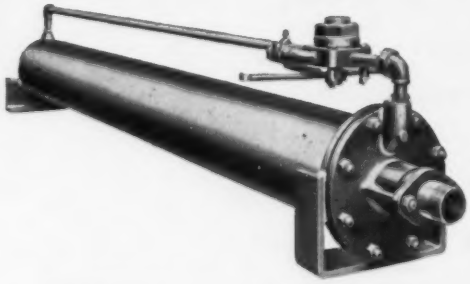

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Tables, rooms, barrels—whichever blast cleaning machine best fills your cleaning needs, Pangborn Rotoblast will speed *your* production.

Pangborn Rotoblast cuts operating time by cleaning *quickly*, throwing a heavy volume of abrasive over a large surface area. The result is higher production and, therefore, lower cleaning costs. Add the "plus" benefits of reduced labor costs and better cleaning quality and we think you'll agree Pangborn Rotoblast is worth investigating. Take a few seconds now to send for more information—it can save you thousands of dollars later.

Write for Bulletin 227 to PANGBORN CORPORATION, 1500 Pangborn Blvd., Hagerstown, Md. *Manufacturers of Blast Cleaning and Dust Control Equipment.*

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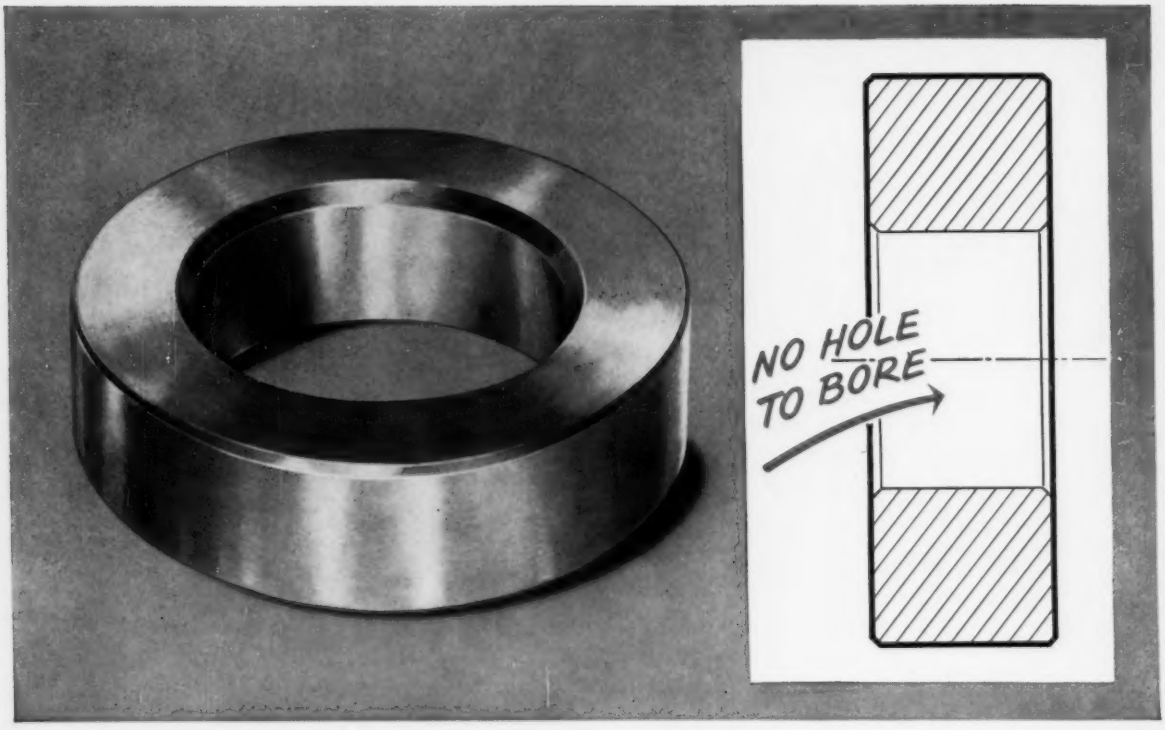

Steps up gear blank production 300% by switching from bar stock to TIMKEN® steel tubing

AN engine manufacturer felt that his gear blanks were costing him too much to make. The center hole had to be bored out of solid bar stock. It took a whole hour to turn out 29 blanks. And a lot of steel was wasted in the process.

So the manufacturer discussed his problem with metallurgists of the Timken Company, experts in fine alloy steel. After study they recommended a change in production methods together with a switch to Timken® seamless steel tubing in place of bar stock.

With Timken seamless steel tubing, the center hole is already there. It doesn't have to be bored out. Finish boring was the engine maker's first production step. And with Timken steel tubing his gear blanks are now being turned out at 120 to 130 an hour—an increase of 300%.

Machining costs have been cut by more than half. And because the center hole is "built-in", no steel is wasted.

The files of the Timken Company contain records of hundreds of problems that have been solved by Timken fine alloy steel. If you have a tough steel problem, why not bring it to us? Wire, write or phone The Timken Roller Bearing Company, Steel and Tube Division, Canton 6, Ohio. Cable address: "TIMROSCO".

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